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University Students in Sudan: Knowledge, Attitude, Behaviour and Practice related to HIV/AIDS/STIs, 2004

By

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بسم الله الرحمن الرحيم

(و أنزلَ اللهُ عَلَيك الكِتاب و الحِكمةَ وعلّمك ما لَم تكُن تعلم و كَانَ فَضلُ اللهِ عَلَيك عظِيماً)

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Dedication

This study would not have been accomplished without the support and encouragement of many people to whom I dedicate this effort: my mother, my brothers and sisters, my wife and my friends.

It is also dedicated to individuals and families who had very hard times living with HIV/AIDS and suffering its wide range of consequences and complications, wishing them a brighter future.

Acknowledgement

I would like to express my sincere gratitude to my supervisor Professor Mohamed Ali Awad El Karim for his guidance, support and encouragement. During the time of this study I learned from him a lot of skills that helped me not only to conduct this study, but I am sure it will help me for the rest of my life.

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This report would not be complete without acknowledging the efforts of Ms Aayesha El Bushra and Mr Hassan Ali who supported the difficult part of data entry and analysis.

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Abbreviations

AIDS:	Acquired Immune Deficiency Syndrome
ANC:	Antenatal Care
BCC:	Behavioural Change Communication
BSS:	Behavioural Surveillance Surveys
FHI:	Family Health International
HAART:	Highly Active Antiretroviral Therapy
HIV:	Human Immunodeficiency Virus
IEC:	Information, Education and Communication
KABP:	Knowledge, attitude, behaviour and practice
MOH:	Ministry of Health
MTCT:	Mother to child transmission
NGOs:	Non-governmental Organizations
PLWHA:	People Living with HIV/AIDS
PPS:	Probability Proportional to Size
SGS:	Second Generation HIV Surveillance
SNAP:	Sudan National AIDS Control Program
SPP:	Strategic Planning Process
SPSS:	Statistical Package for Social Studies
STIs:	Sexually Transmitted Infections
SWOT:	Strengths, Weaknesses, Opportunities and Threats
TB:	Tuberculosis
UNAIDS:	Joint United Nations Programme on HIV/AIDS
WHO:	World Health Organization

Abstract

The global AIDS epidemic is one of the greatest challenges facing humanity. Sudan remains the worst-affected country in the Middle East and North Africa region, with its epidemic concentrated largely in the south.

This was a descriptive cross-sectional study conducted among university students in ten states of the Sudan in 2004. The study objectives were to assess levels of knowledge about HIV and its preventive measures, to identify level of risk to HIV, to estimate prevalence of STIs and assess STIs care-seeking behaviour, to assess levels of HIV related stigma and to identify the best channels for communication and HIV educational programmes.

A sample of 1113 university students was selected in the 10 states, set as priority states by SNAP, using a 2 stage stratified cluster sampling technique. A structured pre-coded questionnaire was used for data collection.

Although levels of knowledge about HIV/AIDS among university students were found to be high, there were still gaps in knowledge about HIV/AIDS. Only 329 (29.6%) students identified mother to child transmission of HIV. Knowledge about HIV preventive measure was weak, especially faithfulness 299 (26.9%) and condom use 136 (12.2%). Misconceptions about HIV transmission were still there, with 191 (17.2%) students mentioned mosquito bite as route of HIV transmission and 117(10.5%) mentioned eating with infected person transmit HIV. These gaps in knowledge were sometimes statistically significantly related to gender and age, the gaps being wider among female students and younger age groups.

Levels of stigma and discrimination against PLWHA were high among university students i.e. 256 (23%) would not accept eating with HIV infected person, two thirds would not accept buying food from HIV infected person and 531 (47.84%) would have tendency to hide HIV infection of a family member.

Almost one third of students, 342 (30.7%), shared blades with others, and 53 (4.8%) students shared needles with others.

Only 52 (4.7%) students ever used condoms. Condom use was higher among males and students with other income sources compared to females and those with no other income sources.

One half of sexually active university students had more than one sexual partners 62.4% of them never used condom.

The estimated prevalence of urethral discharge was 3.1%, vaginal discharge was 8.2% and genital ulcer was 1.3% during the last 12 months among university students.

The majority of university students (87.2%) reported having access to both Radio and Television.

The most preferred communication channels mentioned by university students were TV (62.3%), public lectures (60.0%), Radio (59.4%) and printed materials (45.2%).

The study concluded that there were critical gaps in knowledge about HIV that need to be urgently addressed especially HIV preventive measures, misconceptions about HIV transmission, stigma and discrimination issues. The level of risk to HIV infection among sexually active students was high and use of available services was low including VCT.

It was recommended that SNAP and its partners to review its BCC interventions to properly address identified gaps in knowledge about HIV/AIDS, to conduct qualitative research to analyze the low use of condom and VCT services and to pilot peer education interventions among university students for behavioural change supported by mass media.

ملخص الأطروحة

يعتبر وباء الايدز من أخطر التحديات التي تواجه الانسانية اليوم، و يعتبر السودان الاكثر تأثرا بالوباء بين أقطار الشرق الاوسط و شمال أفريقيا، مع تركز الوباء بجنوب البلاد.

هذه الدراسة تم اجراؤها كدراسة وصفية مقطعية وسط طلاب الجامعات في 10 ولايات بالسودان في العام 2004.

هدفت الدراسة الي قياس مستويات المعرفة بالايدز و عدوي فيروس عوز المناعة البشرى و كيفية الوقاية منه، و تحديد عوامل الخطر التي تزيد احتمالات التعرض لعدوى الفيروس، و تقدير معدلات انتشار الامراض المنقولة جنسيا، كما هدفت الي تقدير معدلات الوصم و التمييز المتعلقة بالايدز و تحديد القنوات المناسبة لتنفيذ برامج الاتصال لتغيير السلوك وسط طلاب الجامعات.

تمت دراسة عينة من 1113 طالب جامعي في 10 ولايات ذات أولوية للبرنامج القومي لمكافحة الايدز، وتم اختيار هذه العينة عن طريق الاختيار العنقودي المتدرج. تم جمع البيانات بواسطة استبيان مشفر.

برغم الارتفاع في معدلات المعرفة بالايدز و عدوى فيروس عوز المناعة البشري، الا اننا نجد بعض النواقص في المعرفة التفصيلية. بلغت المعرفة بالانتقال الرأسى للعدوي 29.6% فقط، كما ان المعرفة بطرق الوقاية ضعيفة خاصة الالتزام بعلاقة جنسية مع شريك واحد غير مصاب (26.9%) و استعمال الواقي الذكري (12.2%). المفاهيم الخاطئة عن انتقال الفيروس موجودة لدي الطلاب اذ أن 17.2% منهم يعتقدون بأن الفيروس ينتقل عن طريق البعوض و 10.5% يعتقدون انه ينتقل عن طريق المشاركة في الأكل. أثبت التحليل الاحصائي ان الاختلاف في مستويات المعرفة بالايدز يرتبط احيانا بالنوع و العمر، حيث أن المعرفة أقل وسط الاناث و الفئات العمرية الدنيا.

سجلت معدلات الوصمة و التمييز المرتبطة بالايدز ارقاما عالية وسط الطلاب، حيث نجد أن 23% منهم يرفض المشاركة في الاكل مع المصابين، 66% لا يقبل ان يشتري طعاما من بائع مصاب بالفيروس، و 47.8% يخفي عن الناس في حالة اصابة احد الاقارب بعدوي الفيروس.

كما وجدت الدراسة ان 30.7% من الطلاب يشارك غيره في استخدام الامواس، و4.8% سبق و ان استخدم محاقن مستعملة.

4.7% فقط من الطلاب استعمل الواقي الذكري، و أثبت التحليل الاحصائي ان الاتجاه لاستعمال الواقي الذكري يزيد بين الذكور و الطلاب الذين لديهم مصادر أخري للدخل مقارنة مع الاناث و الطلاب الذين ليس لديهم مصادر أخري للدخل.

نصف الطلاب الذين يمارسون الجنس لديهم علاقات جنسية مع أكثر من شريك، و 62.4% منهم لم يستعمل العازل الذكرى مطلقا. بلغت معدلات انتشار الافراز الاحليلى 3.1%، و الافراز المهبلى 8.2% و القرحة الجنسية 1.3% خلال العام السابق للدراسة.

87.2% من الطلاب لديهم المقدرة علي مشاهدة التلفاز و الاستماع لبرامج المذياع. القنوات المفضلة لتنفيذ برامج الاتصال و تغيير السلوك هي: البرامج التلفزيونية (62.3%)، المحاضرات العامة (60.0%)، البرامج الاذاعية (59.4) و المواد التعليمية المطبوعة (45.2%).

خلصت الدراسة الي أن هناك قصوراً في مستويات المعرفة عن الايدز يحتاج الي مداخلات عاجلة خاصة المعرفة بطرق الوقاية، المفاهيم الخاطئة والوصمة والتمييز المرتبط بالايدز. كما خلصت الي ان عوامل خطر الاصابة بالفيروس عالية وسط الطلاب الناشطين جنسيا، مع تدني استخدام الخدمات المتاحة حالياً بما في ذلك خدمات الارشاد و الفحص الطوعي.

اوصت الدراسة أن يقوم البرنامج القومي لمكافحة الايدز مع الشركاء بمراجعة مداخلات تغيير السلوك الموجودة و التأكد من أنها تغطي كل الاحتياجات التي كشفتها هذه الدراسة، كما أوصت باجراء بحوث نوعية لمعرفة أسباب تدني معدلات استخدام العازل الذكري وخدمات الارشاد والفحص الطوعي، وتنفيذ مشاريع نموذجية لتعليم الاقران مدعومة بوسائل الاعلام الجماهيري لتغيير السلوك وسط الطلاب.

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Chapter One

Introduction and Literature Review

1. Introduction:

The global AIDS epidemic is one of the greatest challenges facing our generation. AIDS is a new type of global emergency—an unprecedented threat to human development requiring sustained action and commitment over the long term. The epidemic shows no sign of weakening its grip on human society (1).

AIDS has been with us for more than 20 years. It will continue to challenge us for many decades to come. The most important lesson we have learned so far is that we can make a difference: we can prevent new infections, and we can improve the quality of care and treatment for people living with HIV (1).

The AIDS epidemic claimed more than 3 million lives in 2004, and an estimated 4.9 million people acquired the Human Immunodeficiency Virus (HIV) in 2004; bringing to 39.4 million the number of people globally living with the virus (2).

Best current projections suggest that an additional 45 million people will become infected with HIV in 126 low- and middle-income countries (currently with concentrated or generalized epidemics) between 2002 and 2010; unless the world succeeds in mounting a drastically expanded, global prevention effort. More than 40% of those infections would occur in Asia and the Pacific (currently accounts for about 20% of new annual infections) (3).

Although food insecurity and armed conflicts were identified as the main factors fuelling the HIV/AIDS epidemic globally, the paucity of reliable data hinders a better understanding of the complex ways in which HIV/AIDS takes roots –or perhaps even fails to become lodged –in conflict settings. In the Balkans, for example, many of the risk factors commonly associated with HIV spread –mass displacement, sexual violence, large numbers of returning combatants and refugees, trafficking of women and more –have been present over the past decade. Yet available data show very low rates of HIV infection in this region. This may be due to the low level of HIV prevalence at the start of the conflict, or to other factors that are not yet fully understood (3).

Elsewhere, data collated from antenatal sentinel surveillance in eight Tanzanian refugee camps in 2001 indicated that median HIV prevalence among refugee women attending

antenatal clinics was lower than in the women's countries of origin and the country in which the camps were located (3).

Clearly, better data collection, and more research and analysis are urgently needed to establish a better understanding of what countervailing factors might be at work in some settings (3).

In Sudan, the first AIDS case was reported in 1986. By December 31, 2004 the total number of HIV/AIDS cases reported since 1986 was 11,954 cases, of which 5,887 were AIDS cases while 6,067 were asymptomatic HIV infection (4).

The tables below reflect the reported AIDS cases as of end of 2004 (4):

Table 1: Reported AIDS cases in Sudan by years:

Up to 1998	1999	2000	2001	2002	2003	2004	Total
2123	517	652	678	630	744	543	**5887**

Source: Sudan National AIDS Control Programme. HIV/AIDS/STIs Surveillance Annual Report. Khartoum: SNAP, 2004.

Table 2: Reported AIDS cases in Sudan by age and gender:

Age (Year)	During 2004				Cumulative total			
	Male	Female	Unknown	Total	Male	Female	Unknown	Total
0-4	3	4		7	61	35		96
05- 09	1	3		4				
10-14	2	0		2	59	35		94
15-19	4	5		9	112	50		162
20-24	21	13		34				
25-29	47	41		88	1138	686		1824
30-34	69	25		94				
35-39	84	33		117	1709	697		2406
40-44	34	14		48				
45-49	28	14		42	617	201		818
50+	36	13		49	272	82	2	356
Unknown	0	0	49	49	38	1	92	131
Total	**329**	**165**	**49**	**543**	**4006**	**1787**	**94**	**5887**

Source: Sudan National AIDS Control Programme. HIV/AIDS/STIs Surveillance Annual Report. Khartoum: SNAP, 2004.

According to this report, the younger and middle age groups were the mostly affected, with 88.5% of reported AIDS cases being 15 –49 years old. The male to female ratio is a bit above 2:1, with 4,006 males versus 1,787 females being reported as AIDS cases (4). Although the modes of transmission were not included in the 2004 annual report, according to the first quarter report of 2003 the major mode of HIV transmission among reported AIDS cases was heterosexual transmission which accounts for 4,802 (97%) of all reported AIDS cases by that time. Mother to child transmission (MTCT) accounts for 134 (2.7%) of the reported AIDS cases (5).

Compared to other regions of the world where heterosexual contact is the predominant mode of transmission, the male: female ratio is almost 1:1; this finding might suggest under-diagnosis and under-reporting as a possible cause for this discrepancy.

The Sudan National AIDS Control Program (SNAP) considered the reported figures as an iceberg phenomenon due to the following reasons (6):

- Under-diagnosis: not all health facilities can perform a test for HIV.
- Under-reporting: not all the diagnosed HIV/AIDS cases are reported to SNAP.
- Not all people who get sick seek health care in health facilities.
- Wrong diagnosis: some AIDS cases are miss-diagnosed and hence reported as other diseases.

Wrecked by civil war and humanitarian crises, Sudan remains the worst-affected country in the Middle East and North Africa (MENA) region, with its epidemic concentrated largely in the south. Latest estimates show that more than 2% of the adult population were living with HIV at the end of 2003—some 400 000 [120 000–1.3 million] people which amounts to more than 80% of all people with HIV in MENA region. Previous HIV surveillance data have shown HIV prevalence to be up to eight times higher in the south of the country, compared with the capital, Khartoum. It is possible that the gradual cessation of conflict in parts of the country could accelerate HIV spread, as people resume their normal patterns of travel and trade. The effects of conflict continue to thwart up-to-date information-gathering about Sudan's epidemic. The few surveys that have

sought HIV-related information encountered very limited knowledge about the epidemic amid widespread behaviours that could favour HIV transmission (2).
One such investigation, in the towns of Yei and Rumbek, concluded that there was an urgent need for HIV prevention programmes. In Rumbek, for example, although almost one third of respondents had had more than one sex partner in the previous year, a mere 2% had used a condom the last time they had sex with a casual partner and only 20% knew what a condom was (7).

The factors driving the HIV/AIDS epidemic in Sudan were identified as war and the resulting population movement (Displacement, refugees, military personnel), the wide open borders with nine African countries some of which have high HIV prevalence rates, the economic crisis in the country and urbanization (extensive migration from rural to urban areas) (8).
All these conditions interact to provide a hostile environment for high risk sexual behaviours and rapid spread of HIV infection.

Problem statement and justification:

Since its establishment in 1987, the Sudan National AIDS Control Program (SNAP) depends mainly on HIV sentinel surveillance and HIV/AIDS case reporting as the main HIV/AIDS surveillance tools (9).

Furthermore, these tools are not adequately strengthened to monitor the epidemic regularly all over the country; HIV sentinel surveillance being conducted mainly in four sentinel sites (namely, Khartoum, Juba, Wed Medani and Port Sudan) and HIV/AIDS case reporting depends mainly on quarterly notification from the Central AIDS Laboratory in Khartoum. Most recently during 2004, HIV sentinel surveillance was conducted in 20 sites distributed in 7 states (4).

Despite the international progress in issues related to HIV/AIDS surveillance, the program is still using surveillance guidelines developed in 1997 and most recently it was reviewed in 2003. There is a protocol for HIV serosurveillance, but not for behavioural surveillance. Weakness of HIV/AIDS surveillance is a part of a complicated HIV/AIDS situation in Sudan which has resulted from long standing denial, both official and public, mainly due to the conservative culture in the country.

As part of the situation and response analysis carried out for strategic planning purposes, HIV/AIDS/STIs surveillance is identified as one of the major gaps which need careful attention by SNAP (8).

Strengthening of the HIV/AIDS surveillance is one of the most challenging priorities of SNAP due to the following factors:

- The current surveillance system may tell about trends of HIV over place and time, but it will never answer the question why do these changes take place.
- The current system is not suitable, by itself, for monitoring of interventions. It needs to be supported by behavioural tracking methods.
- HIV serological surveillance is not capable of serving as an early warning system, because it discovers HIV infection after its occurrence. Behavioural surveillance can tell about an expected change in HIV trends because it deals with behavioural indicators and thus it can serve as an early warning system.
- HIV sentinel surveillance is not capable of providing all the required information for planners and policy makers to design proper interventions that target priority

factors driving the epidemic. It provides no information about possible factors or sub-populations that drive the epidemic or possible links between high-risk groups and the general population.

- SNAP has recently developed a strategic plan for the coming five years. This comprehensive plan needs an adequate surveillance system to identify and target risk groups, identify bridging populations that spread the virus to the general population, help explain trends in HIV prevalence, proper monitoring of interventions and thus possible modification of the plan to address up coming challenges.

This study is supported by SNAP as part of its plan to initiate behavioural surveillance among certain population sub-groups. The selection of the 10 States where the study was conducted is based on the programme priorities and current interventions.

2. Literature Review:

2.1. Historical Overview:

The acquired immunodeficiency syndrome (AIDS) was first described as a clinical entity in 1981 and human immunodeficiency virus (HIV) was identified as the causative organism in 1983 (10).

The first cases of unusual immune system failure were identified among gay men in the United States (1981). In 1982, acquired immunodeficiency syndrome (AIDS) was first defined. In the course of the year, three modes of transmission (blood transfusion and injecting drug use, sexual intercourse, and mother-to-child transmission) were described. In 1983/84, the human immunodeficiency virus, or HIV, was isolated and identified as the source of what was then a newly recognized disease (11).

HIV infection is predominantly concentrated in developing countries among people in early adult life. Despite the fact that HIV can be isolated from a wide range of body fluids and tissues, the majority of infections are transmitted via semen, cervical secretions and blood. The character of the epidemic in different regions of the world has been influenced by the relative frequency of each of the routes of transmission (10).

2.2. Routes of Transmission (10):

The virus is known to be transmitted via the following routes of transmission:

- Sexual intercourse (vaginal and anal): worldwide, heterosexual intercourse accounts for the vast majority of infections, and coexistent sexually transmitted infections (STIs), especially those causing genital ulceration, enhance transmission. Passage of HIV appears to be more efficient from men to women, and to the passive partner in anal intercourse, than vice versa.
- Mother to child transmission (parentally, perinatally, breast feeding): vertical transmission is the most common route of HIV infection in children. Transmission rates vary from 15-40%. Breast feeding has been shown to increase the risk of vertical transmission by 20%. Factors associated with increased vertical transmission include advanced disease in the mother, prolonged and premature rupture of membranes and chorioamnionitis.
- Contaminated blood, blood products and organ donations.

- Contaminated needles (intravenous drug abuse, injections, and needle-stick injuries): the practice of sharing needles and syringes for intravenous drug use continues to be a major route of transmission of HIV. Healthcare workers have a risk of approximately 0.3% following a single needle-stick injury with known HIV infected blood.

There is no evidence that HIV is spread neither by social or household contact nor by blood-sucking insects such as mosquitoes and bed bugs (10).

2.3. Virology:

HIV belongs to the lentivirus group of the retrovirus family. There are at least two types, HIV-1 and HIV-2. The latter is almost entirely confined to West Africa although there is evidence of some spread to the Indian subcontinent. It is associated with an AIDS-type illness (10).

At present, described HIV isolates are classified into three different groups: a "major" group (or group M), which represents the majority of globally prevalent HIV strains; an "outlier" group (or group O); and a "non-M/non-O" group (or group N) (11).

The distribution of groups N and O is largely limited to certain countries in West Africa where HIV levels are relatively low. In contrast, the M-group HIV-1 strains cause the majority of HIV-1 infections globally. Based on the genetic sequence analyses of the envelope gene of the virus, the group M HIV-1 strains are further classified into at least nine different pure genetic subtypes of HIV-1, designated from A-D, F-H, J and K. An additional level of complexity is added by the phenomenon of genetic recombination between different genetic subtypes, which results in the emergence of mosaic, recombinant viruses. Certain recombinant strains of HIV have been reported to have caused substantial outbreaks and regional epidemics. These are referred to as circulating recombinant forms or CRF (11).

The known genetic subtypes and CRF of HIV-1 are unevenly distributed around the world. For instance, subtype B is found mostly in the Americas, Japan, Australia, the Caribbean and Europe. Subtypes A and D predominate in Central and West Africa, subtype C in southern Africa, the horn of Africa and India, and subtype E in South East Asia. Subtypes F (Brazil and Romania), G and H (Russia and Central Africa), and Group

O (Cameroon) are also present in some parts of the world but at very low prevalence (11).

Subtype B is associated mostly with homosexual contact and injecting drug use (essentially via blood). The recent, rapidly spreading HIV epidemic in Eastern Europe among injecting drug users is largely associated with a new B/A CRF. The epidemic in South-East Asia is mostly fuelled by heterosexual transmission of subtype C in India and China, or the A/E CRF in Thailand and neighbouring countries. However, it is still unclear whether some subtypes or their recombinant forms may be more infectious or more transmissible than others (11).
It is almost certain that as the global epidemic evolves, the known subtypes will continue to spread to new areas while new recombinants continue to emerge. The genetic variability of HIV poses special problems for HIV diagnosis, treatment and HIV vaccine development. It is therefore important to monitor the distribution and dynamics of HIV subtypes at a global level, and this is an objective of the WHO-UNAIDS-sponsored "Network for HIV Isolation and Characterization" (11).

The interrelationship between HIV and the host immune system is the basis of the pathogenesis of HIV disease. The host cellular receptor that is recognized by HIV surface glycoprotein is the CD4 molecule which defines the cell populations that are susceptible to infection. Immunopathogenesis is a result of defective T-cell homeostasis in HIV infection. The progressive and severe depletion of CD4 helper lymphocytes has profound repercussions for the functioning of the immune system. Cell mediated immunodeficiency which is the major consequence leaves the host open to infections with intracellular pathogens, whilst the coexisting antibody abnormalities predispose to infections with capsulated bacteria. HIV also has a direct effect on certain tissues, notably the nervous system (10).

2.4. Diagnosis:

HIV infection is diagnosed either by the detection of virus-specific antibodies (anti-HIV) or by direct identification of viral material (10).

The spectrum of illnesses associated with HIV infection is broad and is the result of both direct HIV effects and the associated immune dysfunction. The 2-4 weeks immediately following infection are usually silent both clinically and serologically. The majority of HIV seroconversions are also clinically silent. In a proportion, a self-limiting non-specific illness occurs 6-8 weeks after exposure (10).
The end of the "window period" is defined as the time when sufficient antibodies are available to be detected by current tests. Antibodies are much easier (and cheaper) to detect than the virus itself (11).
It is sometimes possible to detect HIV antigen, i.e. the virus itself, during the window period if, by coincidence, an individual is antigen-tested during the short period during which there are high levels of circulating virus particles. After this peak, the level of antigen steeply declines to the point where it is no longer detectable. The level of HIV antigen fluctuates or rises steeply again, usually years later, when the clinical situation of the patient starts to deteriorate with the onset of AIDS. Current treatments (Highly Active Antiretroviral Therapy or HAART which is a combination of different antiretroviral drugs) can control virus replication in most patients, reducing their HIV virus load in blood, but these treatments are not capable of eradicating the virus (11).

The majority of people with HIV infection are asymptomatic for a substantial but variable length of time. However, the virus continues to replicate and the person is infectious. Studies suggest a median time of 10 years from infection to development of AIDS, although some patients progress much more rapidly and others have remained symptom-free for up to 15 years. As HIV infection progresses the CD4 count falls, the viral load rises and the patient develops an array of symptoms and signs. The clinical picture is the result of direct HIV effects and of the associated immunosuppression (10).

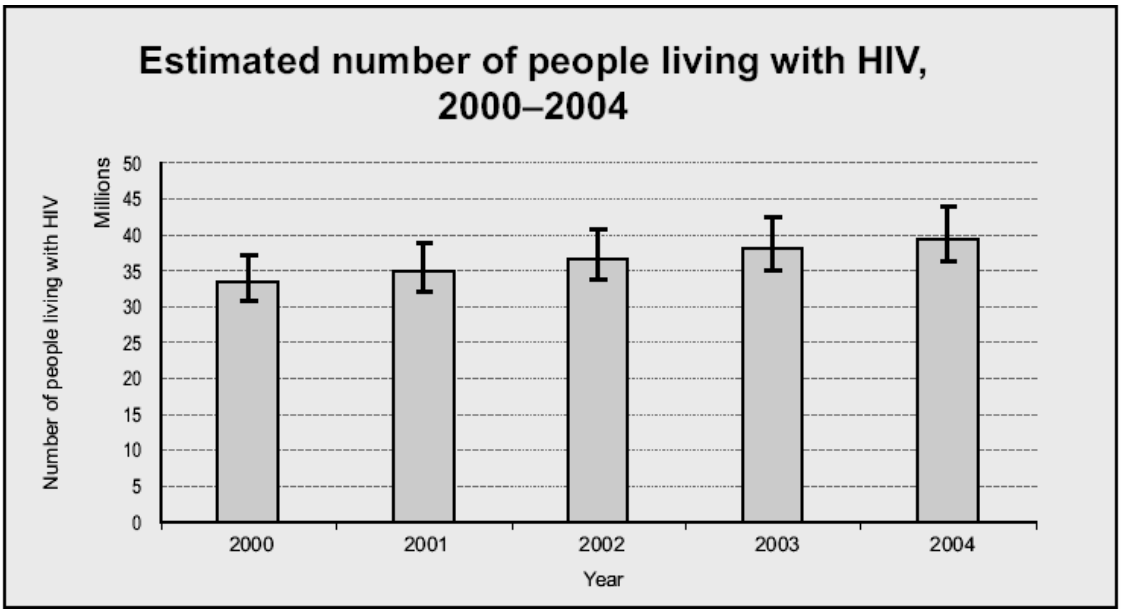
Common to other diseases, the accuracy of different HIV diagnostic tests are measured according to their sensitivity and specificity. A test with high sensitivity is one that can detect even minute amounts of antibodies. A test with high specificity is one which identifies all negatives correctly (i.e. produces no false positives). All tests have a margin of error. Different tests are therefore recommended for different purposes. Tests with

high sensitivity should be used when the objective is to minimize the number of false negative results, such as in the screening of donated blood. When the objective is to minimize false-positives, such as in confirming whether an individual is HIV-infected, tests with high specificity should be used (11).

2.5. Global Epidemiology of HIV/AIDS:

The total number of people living with the human immunodeficiency virus (HIV) rose in 2004 to reach its highest level ever: an estimated 39.4 million [35.9 million–44.3 million] people are living with the virus. This figure includes the 4.9 million [4.3 million–6.4 million] people who acquired HIV in 2004. The global AIDS epidemic killed 3.1 million [2.8 million–3.5 million] people in 2003 (2).

Figure 1: Global annual estimation of people living with HIV/AIDS, 2000- 2004:



Source: UNAIDS/WHO. AIDS Epidemic Update. UNAIDS/04.45E. Geneva: UNAIDS/WHO, December 2004

The number of people living with HIV has been rising in every region, compared with two years ago, with the steepest increases occurring in East Asia, and in Eastern Europe and Central Asia. The number of people living with HIV in East Asia rose by almost 50%

between 2002 and 2004, an increase that is attributable largely to China's swiftly growing epidemic (2).

In Eastern Europe and Central Asia, there were 40% more people living with HIV in 2004 than in 2002. Accounting for much of that trend is Ukraine's resurgent epidemic and the ever-growing number of people living with HIV in the Russian Federation (2).

Sub-Saharan Africa remains by far the worst-affected region, with 25.4 million [23.4 million– 28.4 million] people living with HIV at the end of 2004, compared to 24.4 million [22.5 million– 27.3 million] in 2002. Just under two thirds (64%) of all people living with HIV are in sub-Saharan Africa, as are more than three quarters (76%) of all women living with HIV (2).

HIV prevalence in the Caribbean is the second-highest in the world, exceeding 2% in five countries, and AIDS has become the leading cause of death among adults aged 15–44 years in this region. Yet, a growing number of Caribbean countries are showing that the epidemic does yield to appropriate and resolute responses (2).

2.5.1. Sub-Saharan Africa (2):

Sub-Saharan Africa has just over 10% of the world's population, but is home to more than 60% of all people living with HIV—some 25.4 million [23.4 million–28.4 million]. In 2004, an estimated 3.1 million [2.7 million–3.8 million] people in the region became newly infected, while 2.3 million [2.1 million–2.6 million] died of AIDS. Among young people aged 15–24 years, an estimated 6.9% [6.3–8.3%] of women and 2.2% [2.0–2.7%] of men were living with HIV at the end of 2004.

Adult HIV prevalence has been roughly stable in recent years. But stabilization does not necessarily mean the epidemic is slowing. On the contrary, it can disguise the worst phases of an epidemic—when roughly equally large numbers of people are being newly infected with HIV and are dying of AIDS.

While HIV prevalence measured at antenatal clinics has edged lower in parts of some countries and in specific age groups, there is no sign yet of an overall, national decline in any southern African country. It is vital, however, to bear in mind that prevalence levels present a delayed picture of the epidemic, since they reflect HIV incidence patterns of several years previously. HIV prevalence describes the total number of people living with

HIV, irrespective of when they have been infected; incidence, on the other hand, refers to the number of people who became infected over a specific period, usually the previous year. Across the sub-region, prevention and treatment efforts have grown manifold in the past five years—in both scope and scale. There is no simple and reliable method to assess HIV incidence in sub-Saharan Africa. The closest proxy would be HIV prevalence in 15–24 year old pregnant women. In South Africa, infection levels continue to rise in that age group of women, while in the other countries in southern Africa, the indicator reveals little sign of change.

HIV infection is becoming endemic in sub-Saharan Africa. Current high prevalence levels mean that even those countries that do eventually reverse the epidemic's course will have to contend with serious AIDS epidemics for many subsequent years. The destruction produced by AIDS will shape the lives of several generations of Africans.

But underlying this diversity are some striking consistencies. Across the region, women are disproportionately affected by HIV. On average, there are 13 women living with HIV for every 10 infected men and the gap continues to grow. In most countries, women are being infected with HIV at earlier ages than men. The differences in infection levels between women and men are most pronounced among young people (aged 15–24 years). Recent population-based studies suggest that there are on average 36 young women living with HIV for every 10 young men in sub-Saharan Africa.

2.5.2. Caribbean:

More than 440 000 [270 000–780 000] people are living with HIV in the Caribbean, including the 53 000 [27 000–140 000] people who acquired the virus in 2004. An estimated 36 000 [24 000–61 000] people died of AIDS in the same year. Among young people 15–24 years of age, an estimated 3.1% [1.6–8.3%] of women and 1.7% [0.9–4.6%] of men were living with HIV at the end of 2004. In the Caribbean Community (CARICOM) region 370 000 [210 000–710 000] people are living with HIV, including the 48 000 [22 000–140 000] people who acquired the virus in 2004. More than 29 000 [17 000–54 000] people died of AIDS in the past year (2).

With average adult HIV prevalence of 2.3%, the Caribbean is the second-most affected region in the world. In five countries (the Bahamas, Belize, Guyana, Haiti and Trinidad

and Tobago), national prevalence exceeds 2%. Overall, the highest HIV-infection levels among women in the Americas are in Caribbean countries and AIDS has become the leading cause of death in the Caribbean among adults aged 15–44 years (12).

Unlike in Latin America, HIV transmission in the Caribbean is occurring largely through heterosexual intercourse (almost two thirds of all AIDS cases to date are attributed to this mode of transmission), although sex between men, which is heavily stigmatized, and in some places illegal, remains a significant—but still neglected—aspect of the epidemics. HIV transmission through injecting drug use remains rare, with the significant exception of Bermuda, where it accounts for a large share (43%) of AIDS cases, and Puerto Rico, where more than half of all infections in 2002 were associated with injecting drug use and about one quarter were heterosexually transmitted (1, 13).

As the epidemics in this region evolve, more women are being affected, and the number of new HIV infections among them now outstrips that among men. Latest estimates suggest that roughly as many women as men are now living with HIV in this region. According to a population-based survey carried out in 2002, women younger than 24 years in the Dominican Republic were almost twice as likely to be HIV-infected compared with their male peers (14). In Jamaica teenage girls are 2.5 times more likely than boys in the same age group (10–19 years) to be infected—due partly to the fact that some girls have sexual relationships with older men who are more likely to be HIV-infected, a trend that has also been documented in several other countries (2).

The lack of good quality HIV-surveillance data in most Caribbean countries is hampering the ability to design and run potentially effective prevention programmes, and will almost certainly undermine efforts to expand access to antiretroviral treatment. But social, not just technical, challenges will need to be confronted if the countries of this region are to bring their epidemics under control. Widespread homophobia is providing an ideal climate for the spread of HIV by driving men who have sex with men further away from the information, services, and security they need if they are to protect themselves against HIV. Meanwhile, the unequal social and economic status of women and men is acting as a powerful dynamic in epidemics that are growing amid ongoing stigma, misconceptions and denial (2).

2.5.3. Asia (2):

National HIV infection levels in Asia are low compared with some other continents, notably Africa. But the populations of many Asian nations are so large that even low national HIV prevalence means large numbers of people are living with HIV. Latest estimates show some 8.2 million [5.4 million–11.8 million] people (2.3 million [1.5 million–3.3 million] adult women) were living with HIV at the end of 2004, including the 1.2 million [720 000–2.4 million] people who became newly infected in the past year. AIDS claimed some 540 000 [350 000–810 000] lives in 2004. Among young people 15–24 years of age, 0.3% of women [0.2–0.6%] and 0.4% of men [0.3–0.8%] were living with HIV by the end of 2004.

Asia is not just vast but diverse, and HIV epidemics in the region share that diversity, with the nature, pace and severity of epidemics differing across the region. Overall, Asian countries can be divided into several categories, according to the epidemics they are experiencing. While some countries were hit early (for example, Cambodia, Myanmar and Thailand), others are only now starting to experience rapidly expanding epidemics and need to mount swift, effective responses. They include Indonesia, Nepal, Viet Nam, and several provinces in China. In Myanmar and in parts of India and China, HIV has become well-entrenched in some sections of society, despite modest efforts to halt the virus' spread. Other countries are still seeing extremely low levels of HIV prevalence, even among people at high risk of exposure to HIV, and have golden opportunities to pre-empt serious outbreaks. These countries include Bangladesh, East Timor, Laos, Pakistan, and the Philippines.

Some countries, by sheer virtue of size, simultaneously fit several of those descriptions: China and India are examples. These two countries, home to some 2.35 billion people, are experiencing several distinct epidemics, some already very serious.

Most new HIV infections in Asia occur when men buy sex—and large numbers of men do so. Household-based surveys in a number of Asian countries suggest that between 5% and 10% of men buy sex, which makes commercial sex a large and lucrative industry in Asia. Many sex workers—especially very young women from rural areas—are either

coerced into the industry or join it under duress, because they lack other employment opportunities. Studies among sex workers in China, for example, have found that young and ill-educated women from rural areas sell sex because they could not find other work. However, others sometimes opt for the profession instead of arduous, low-paying jobs. In Viet Nam for example, sex workers have reported earning up to seven times the average income of other workers in the areas where they plied their trade. Their counterparts in Nepal have reported earning six times the average wage income.

2.5.4. Eastern Europe and Central Asia (2):

In Eastern Europe and Central Asia the number of people living with HIV has risen dramatically in just a few years—reaching an estimated 1.4 million [920 000–2.1 million] at the end of 2004. This is an increase of more than nine-fold in less than ten years. Some 210 000 [110 000–480 000] people were newly infected with HIV in the past year, while an estimated 60 000 [39 000–87 000] died of AIDS. Among young people 15–24 years of age, an estimated 0.8% [0.4–1.6%] of women and 1.7% [0.8–3.7%] of men were living with HIV at the end of 2004.

Diverse HIV epidemics are underway in this region. The most serious and firmly-established epidemic is in Ukraine, which is experiencing a new surge of reported infections, while the Russian Federation is home to the largest epidemic in the entire region (indeed in all of Europe). However, HIV is unevenly distributed in Russia, with about 60% of all HIV infections to date having been reported in just 10 of the country's 89 regions. There is considerable scope for further expansion of the epidemic in this vast country—alongside great opportunities to prevent such an outcome. Several Central Asian and Caucasian republics have entered the early stages of the epidemic, while in south-eastern Europe HIV has acquired a tenuous presence amid behaviour patterns that favour significant spread of the virus.

Amid such diversity, four features stand out. On the whole, most of the epidemics in this region are still in their early stages—which means that timely, effective interventions can halt and reverse them. Secondly, the vast majority of people living with HIV in this region are young; more than 80% of the reported infections are being found among

people below the age of 30 years (by comparison, in Western Europe some 30% of people with HIV fall in that age group). Thirdly, sexual transmission of HIV is increasing in each of the most seriously-affected countries—an indication that the epidemic has gained a foothold in the wider population. Fourthly, ongoing, arduous social and economic transitions serve as the context in which extraordinarily large numbers of young people are injecting drugs. In countries with emerging epidemics demand-reduction programmes that discourage drug use and harm reduction programmes that reduce drug injecting and prevent HIV transmission through contaminated injecting equipment among young people can prevent larger, more extensive HIV epidemics of the kind now taking hold in Russia and Ukraine. This would entail a comprehensive set of interventions to lessen the vulnerability of young people and reduce the numbers of people initiated into drug injecting, alongside large-scale harm reduction and safer-sex programmes.

2.5.5. Middle East and North Africa (2):

Concerns that HIV would continue to strengthen its presence in the Middle East and North Africa are borne out by the latest estimates which show that 92 000 [34 000–350 000] people became infected with HIV in 2004. That brings to 540 000 [230 000–1.5 million] the total number of people living with the virus in this region. AIDS killed an estimated 28 000 [12 000–72 000] people in 2004. Among young people 15–24 years of age, 0.3% of women [0.1–0.8%] and 0.1% of men [0.1–0.3%] were living with HIV by the end of 2004. HIV is being transmitted along diverse paths in this region, including paid sex, sex between men and injecting drug use, and there exists significant scope for further expansion of the epidemic.

Wracked by civil war and humanitarian crises, **Sudan** remains the region's worst-affected country, with its epidemic concentrated largely in the south. Latest estimates show that more than 2% of the adult population were living with HIV at the end of 2003—some 400 000 [120 000–1.3 million] people which amounts to more than 80% of all people with HIV in this region (UNAIDS, 2004). Previous HIV surveillance data have shown HIV prevalence to be up to eight times higher in the south of the country, compared with the capital, Khartoum. It is possible that the gradual cessation of conflict

in parts of the country could accelerate HIV spread, as people resume their normal patterns of travel and trade. The effects of conflict continue to thwart up-to-date information-gathering about Sudan's epidemic.

In most other countries, the epidemics are still in their early stages—which boosts the chances that effective prevention efforts can limit further spread of the virus. It must be noted, however, that inadequate surveillance data in several countries could mean that significant HIV outbreaks in some populations (including men who have sex with men and injecting drug users) are being missed.

Effective prevention is needed across the region in order to arrest HIV epidemics in their early stages. Meanwhile, effective interventions depend on systematic and reliable information about the epidemics' patterns and trends. On both those fronts, too many countries are still too "slow off the mark". Even basic steps such as condom promotion are largely absent in the region. Efforts to defuse the social stigma and institutional discrimination experienced by vulnerable groups remain few and far between; so, too, education and communication to deepen public knowledge of the epidemic.

2.5.6. Women and HIV/AIDS:

The AIDS epidemic is affecting women and girls in increasing numbers. Globally, just under half of all people living with HIV are female. In most regions, an increasing proportion of people living with HIV are women and girls, and that proportion is continuing to grow, particularly in Eastern Europe, Asia and Latin America (1).

AIDS is affecting women most severely in places where heterosexual sex is a dominant mode of HIV transmission, as is the case in sub-Saharan Africa and the Caribbean. Women and girls make up almost 57% of adults living with HIV in sub- Saharan Africa. Overall, three quarters of all women with HIV worldwide live in that region (15, 16).

According to recent population-based household surveys, adult women in sub- Saharan Africa are up to 1.3 times more likely to be infected with HIV than their male counterparts. This unevenness is greatest among young women aged 15–24 years, who are about three times more likely to be infected than young men of the same age (1).

In South Africa, Zambia and Zimbabwe, for example, young women (aged 15–24 years) are three to six times more likely to be infected than young men (17, 18). More than three quarters of all young people living with HIV in those countries are women (19, 20).
Women constitute nearly half of the 420,000 [260,000– 740,000] adults living with HIV in the Caribbean, where young women 15–24 years of age are almost twice as likely to be infected than are young men (21).
In Russia, which has the biggest epidemic in Eastern Europe and Central Asia, the proportion of women among people diagnosed with HIV increased to 38% in 2003, compared with 24% in 2001 (22).

2.6. HIV/AIDS Surveillance:

As the HIV/AIDS epidemic imposes an ever-larger burden globally, surveillance for HIV becomes more critical in order to understand the trends of the epidemic and to make sound decisions on how best to respond to it. This is especially true in developing countries, which account for a disproportionate share of new and long-standing infections. To help countries focus their surveillance activities in the context of their epidemic state (low-level, concentrated, or generalized), the World Health Organization (WHO) and the Joint United Nations Programme on HIV/ AIDS (UNAIDS) have developed a conceptual framework to improve HIV surveillance—second generation HIV surveillance. Guidelines for second generation HIV surveillance suggest approaches to make better use of data to increase and improve the response to the HIV epidemic (23).

More than a decade has passed since the initial guidelines on HIV surveillance were drafted by World Health Organization (WHO) in 1989. As HIV continues to spread around the world, it has become increasingly apparent that the epidemic does not follow the same course in all societies. Rather it affects different geographical areas and populations sub-groups in different ways at different times (24).
The HIV/AIDS pandemic is composed of multiple and dynamic epidemics, even within a country. Therefore, HIV surveillance systems should be capable of being adapted and modified to meet the specific needs of each epidemic (25).

This complicates the task of monitoring its course, intervening to prevent the future spread of HIV, and planning to minimize its impact. It also makes a thorough understanding of the nature of each country's epidemic more vital than ever (24).

Such an understanding can only be achieved with more information about who are most at risk in a country, and which behaviours put them at risk. Solid behavioural data will identify sub-populations at risk and will help focus serosurveillance resources where they will yield maximum information about the epidemic. Behavioural data also help explain trends in prevalence in mature epidemics. Second generation surveillance systems aim at monitoring trends in behaviour as well as HIV infection. They build on lessons learned in the first decade of surveillance, strengthening and expanding existing systems to achieve the goals of second generation surveillance (24).

The goals of second generation HIV surveillance systems are (24):

- Better understanding of trends over time.
- Better understanding of the behaviours driving the epidemic in a country.
- Surveillance more focused on sub-populations at highest risk of infection.
- Flexible surveillance that moves with the needs and state of the epidemic.
- Better use of surveillance data to increase understanding and to plan prevention and care.

HIV/AIDS surveillance plays a central role in HIV/AIDS control programs. Surveillance data have been crucial in many countries for generating a public response to HIV. This is especially important given the long years before large numbers of AIDS cases begin to appear, during which the epidemic remains invisible (24).

One of the most important uses of surveillance data is to direct efforts to slow the spread of HIV. Surveillance data can demonstrate who is infected and who is at risk of infection, identifying sub-groups in need of active prevention programmes. Perhaps the most useful data in targeting prevention activities are behavioural data, which has often not been integrated into regular surveillance systems (24).

Since HIV infection typically takes many years to develop into symptomatic illness, the impact of the epidemic is not seen for some time after HIV infection levels begin to rise. Surveillance data provide the inputs for models from which national estimates of

infection, and projections of the illness and death that inevitably follow, are derived. National estimates and projections have proven extremely useful in raising awareness about the epidemic. They are also extremely valuable for planning to mitigate the impact of the epidemic (24).

Surveillance systems by definition monitor trends over time. Serosurveillance monitors trends in infection, while behavioural surveillance monitors trends in the behaviours that lead to infection. Taken together, data generated by these two branches of surveillance have been able to give an indication of the impact of national efforts to reduce HIV infection and increase safe behaviour (24).

Linking HIV surveillance and behavioural data collection in antenatal clinic attendees would seem an efficient way to correlate HIV sero-status with specific behaviours or behavioural changes. However, pregnant women are not considered to be a suitable population for behavioural surveillance because asking women in the later stages of pregnancy about their sexual behaviour and condom use will not generally yield results that are typical of the sexually active population at large. Adding HIV testing to population-based studies such as the demographic health surveys may allow the linking of core behavioural data to HIV test results. However, the cost and complexity of collecting HIV and behavioural data from the same people in population-based studies are notable, and interpretation of the obtained information is complicated by the potential biases introduced by this survey procedure and the risk of correlating present behaviours with past infections (26, 27). Population-based studies carried out periodically in the catchment areas of ANC sentinel sites can help evaluate the sources of bias in different country settings (28, 29).

Most surveillance efforts to date have concentrated on tracking AIDS cases or the spread of HIV itself. Because a person can live with HIV for many years before it is detected, HIV prevalence figures reflect a mix of old and new infections, and are not that useful for documenting recent changes in new infection rates. When HIV prevalence is rising, it gives a good indication that prevention programmes are failing; but no indication of why. On top of that, HIV surveillance by itself is of limited use in places where HIV infection is still relatively uncommon. Continued low prevalence in a population may mean that

members of the population do not engage in behaviour that would expose them to HIV, perhaps because HIV prevention programmes have been successful. Or it may simply mean that the virus has not yet reached a critical mass in that population. If risk behaviours do exist but are not recorded, the opportunity to plan programmes to reduce risk before the virus explodes through a population with risk behaviour will be lost (30).

Second generation surveillance systems do not propose any radically new methods of data collection. Rather, they focus existing methods on appropriate populations and sub-populations, and combine them in ways that have the greatest explanatory power. Second generation systems aim to expand the use of some of the more rarely used methods, particularly behavioural data collection (24).
Just as HIV surveillance refers to repeated cross-sectional serosurveys in a representative population, behavioural surveillance refers to repeat cross-sectional surveys of behaviour in a representative population. There are two major types of behavioural survey for HIV: surveys in the general population, and surveys in specific sub-populations of interest (24).

The fundamental principles around which second generation surveillance systems are based (24):

- Be appropriate to the epidemic state.
- Be dynamic, changing with the epidemic.
- Use resources where they will generate most useful information.
- Compare biological and behavioural data for maximum explanatory power.
- Integrate information from other sources.
- Use data produced to increase and improve the national response.

Recognizing the heterogeneity of HIV epidemics around the world, second generation surveillance meets different surveillance needs in different epidemic states. Surveillance systems are designed to answer the needs of a particular country situation at a particular point in its epidemic evolution. Classification of epidemic states has shifted as the world has learned more about the heterogeneity of HIV. For the purposes of surveillance,

UNAIDS and WHO suggest a classification that describes the epidemic by its current state –low level, concentrated or generalized. This typology recognizes that a country may shift from one state to another over time. It is important to stress however, that such a shift is by no means an inevitable progression. The numerical cut-off points are not rigid scientific classifications. They act, rather, as a convenient proxy for classification based on the dynamic of an epidemic. The different epidemic states are described as follows (24):

Low-level epidemic:

Principle: Although HIV infection may have existed for many years, it has never spread to significant levels in any sub-population.

Numerical proxy: HIV prevalence has not consistently exceeded 5% in any defined sub-population.

Concentrated epidemic:

Principle: HIV has spread rapidly in a defined sub-population, but is not well-established in the general population.

Numerical proxy: HIV prevalence consistently over 5% in at least one defined sub-population. HIV prevalence is below 1% in pregnant women in urban areas.

Generalized epidemic:

Principle: HIV is firmly established in the general population.

Numerical proxy: HIV prevalence consistently over 1% in pregnant women.

Second generation surveillance is built upon a country's existing data collection system. Therefore there is a need to evaluate the surveillance system, identifying what worked and which gaps remain. Once the limitations of the current system are identified, it becomes easier to elaborate a national plan for surveillance (25).

Second generation surveillance aims to improve the quality and diversity of information sources. In order to achieve that, standard and rigorous protocols have to be developed and implemented using appropriate methods and tools (25).

Information generated by effective surveillance systems is essential for health professionals, national governments and international agencies in mounting an adequate national and international response to the HIV/AIDS epidemic. In addition to being used for estimating the magnitude of the epidemic and monitoring its trends, surveillance data are essential for advocacy, strengthening commitment, mobilizing communities, advocating for sufficient allocation of resources to national programmes, and assisting in targeting interventions to people or places with high-risk behaviours (31).

Second-generation HIV surveillance systems provide a comprehensive and appropriate response to the information needs of AIDS control programmes. Their implementation, including a better use of the data generated by the system, will ensure that national programmes are in the best possible position to respond to the challenges of the epidemic (31).

2.7. HIV/AIDS Surveillance in Sudan:

With the exception of a few countries, systematic surveillance of the epidemic is not well developed in North Africa and the Middle East. Furthermore, there is inadequate monitoring of the situation among populations at higher risk of HIV exposure, such as sex workers, injecting drug users and men who have sex with men. This means that potential epidemics in these populations are being overlooked. In many countries, available information is based only on case reporting, and suggests that around 480 000 people (range: 200 000–1.4 million) are living with HIV in the region, which has a prevalence of 0.2% of the adult population (range: 0.1–0.6%). Some 75 000 people (range: 21 000–310 000) are believed to have become newly infected in 2003, and AIDS killed about 24 000 (range: 9900–62 000) that year. Among young people aged 15–24, 0.2% of women (range: 0.2–0.5%) and 0.1% of men (range: 0.1–0.2%) were living with HIV by the end of 2003 (1).

Sudan is by far the worst-affected country in the region. Its overall HIV prevalence is nearly 2.3% (range: 0.7–7.2%); the epidemic is most severe in the southern part of the country. Heterosexual intercourse is the principal mode of transmission. The virus is spreading in the general population, infecting women more rapidly than men. Among pregnant women in the south, HIV prevalence is reported to be six-to-eight times higher than around Khartoum in the north (1).

Results from sentinel surveillance report showed HIV prevalence among patients presenting with sexually transmitted infections (STIs) in Khartoum was 0.6% in 1991. In Port Sudan it was 0% and 0.3% in 1991 and 2.4% in 1992 while in Medani it was 0.8% and 0.6% in 1991 and 1.6% in 1992. In Juba, HIV prevalence among STIs patient was 5.2% and 9.9% in 1991, 1.59% in 1993 and 6.6% in 1994. Surveys carried out among STIs patients in other sites showed prevalence of 0.3% in El Obied 1992, 0.7% in El Fashir 1992 and 6.0% in Wau 1994. [6] Sentinel surveillance activities were also conducted among tuberculosis (TB) patients. HIV prevalence among TB patients in Khartoum was 0% and 0.5% in 1991 and 2.6% in 1993. In Port Sudan it was 0% in 1991 and 0.5% in 1992, while in Medani it was 0% in 1991 and 1.6% in 1992. Juba showed a prevalence of 14% and 16.2% in 1991 and 13.6% in 1993 (32).

In 2002, SNAP has conducted a wide behavioural and serological survey as part of the HIV/AIDS/STIs situation analysis which was carried out for strategic planning purposes. A stratified sampling method was adopted, and the survey was conducted in 14 out of the 26 states of the country, targeted both low and high risk groups (8).

A total of 7,385 blood samples were tested and out of those 118 were positive, the overall prevalence of HIV was 1.6%. HIV prevalence among women attending antenatal care (ANC) clinics was 1.0%, refugees 4.0%, prostitutes 4.4%, TB patients 1.6% and tea sellers 2.5% (8).

Regarding knowledge, attitude, behaviour and practice (KABP), 78.6% of the respondents heard about AIDS, 53.2% mentioned sexual intercourse as a mode of transmission and less than 10% mentioned use of condom as HIV preventive measure. Only 21.1% heard about condom and 3.7% ever used male condom (8).

Some vital behavioural indicators provided by the survey were as follows (8):

- Consistent condom use with non regular partner, non commercial partner:
  - Males: 1.3%
  - Females: 0.6%
  - Prostitutes: 3.0%
- Condom use at last sex with a commercial partner:
  - Males: 1.9%
  - Females: 0.9%
  - Youth: 0.9%
  - Adults: 1.3%
  - Prostitutes: 4.3%
- Unprotected sex with high risk partner:
  - Males: 26.7%
  - Females: 8.9%
- Youth using condom at last sex:
  - All: 0.6%
- Non regular partner in the last 12 months:
  - Youth: 9.5%
  - Adults: 12.0%
- Youth with multiple partners:
  - All: 9.9%
- Age at first sexual intercourse:
  - Youth: 12 years
  - Adults: 16 years
- Population seeking voluntary HIV testing:
  - Young people: 0.3%
  - Adults: 0.4%
  - All: 0.4%
- Exposure to intervention:
  - Youth: 19.6%
  - Adults: 24.4%

2.8. BSS Experiences from other countries:

BSS have been conducted in more than 20 countries - primarily in Africa and Asia since 1992, and their use in Latin America the Caribbean is growing. Since 1999 they have been in use in cross-border sites in Asia and Africa, where they have proved to be beneficial in understanding the pandemic from regional instead of country-specific perspective. In several countries multiple rounds of BSS have been conducted already, with the trend data used to formulate new programmes and to adapt existing ones (33 – 35).

A key benefit of the methodology is its standardised approach to questionnaire development, sampling frame construction, and survey implementation and analysis.

BSS findings serve many purposes: they yield evidence of project impacts, provide indicators of project successes and highlight persistent problem areas, identify appropriate intervention priority populations, identify specific behaviours in need of change, function as a policy and advocacy tool, and supply comparative data concerning behavioural risks (33 – 35).

2.8.1. Zimbabwe (33):

HIV prevalence among antenatal clinic attendees in the major urban areas of Harare, Bulawayo and Chitungwiza in Zimbabwe increased from 10% in 1989 to 36% in 1994. Age specific data from Harare in 1995 revealed that 26% of antenatal clinic attendees under 20 years of age were HIV positive.

In a 1995 HIV prevalence study among female sex workers in Harare, 86% tested HIV positive. For STD clinic patients in Harare, HIV prevalence increased from 52% in 1990 to 71% in 1995. Outside of Harare, HIV prevalence among STD clinic patients increased from 6 % in 1987 to 72% in 1996. Clearly, Zimbabwe has been very severely affected by the HIV pandemic, and by the end of 1999, UNAIDS estimated that 25% of the adult population (aged 15-49) were HIV infected, predominantly through heterosexual intercourse.

Important characteristics of the BSS methodology are that it employs a cross-sectional design which conforms to a standardized sampling process and collects information on standardised indicators. As a result of obtaining representative samples from defined

geographic locations, that process can be repeated to monitor trends over time, and to compare indicators between sites.

2.8.1.1. Male Youth (20-24 years of age) (33)

The mean age of the 800 young male respondents was 21 years, they were all unmarried, 82% were living with their families, and they had a mean of 12 years formal education. Sixty percent (60%) had ever had sex, and for those, the median age at first sex was 19 years.

Forty three percent (43%) used a condom the first time they had sex, and 74% used a condom in their last sex act. For 18% of young men sexually active in the previous 12 months, their last sexual partner was known to have other partners**.**

Fifty eight (7%) male youth had ever had an STI, 33 (4%) reported a urethral discharge in the past year and 20 (3%) had a genital ulcer. Only 23 (52%) of the 44 young men who suffered STI symptoms attended a trained health worker, and none stopped sexual activity when they had symptoms or reported additional condom use. Fifty six percent (56%) sought care within one week of symptoms.

Being faithful to one partner was identified as an HIV prevention method by 71%, but abstinence and having fewer partners were identified by only 42% and 7% respectively. Ninety four percent (94%) knew that a healthy looking person could be HIV infected, 37% had a close relative who was infected, and almost 87% stated that they were willing to look after an HIV infected family member.

Half of the young men reported sex with a non-regular or commercial partner within the previous year, and around 40% of those had more than one partner. Condom use at last risky sex was lower in Harare than Gweru but there is clear room for improvement in both.

2.8.1.2. Female Youth (18-22 years of age) (33)

The mean age of the 800 unmarried young women respondents was 20 years, 86% were living with their families and they had a mean of 10 years formal education. Almost one third (31%) reported having made their sexual debut, and 13% of those reported that they had been forced to have sex in the past year. Fifty two percent (52%) used a condom the

first time they had sex and 72% of those sexually active in the last year used a condom in their last sexual encounter, of whom 21% provided the condom herself. Over 10% of sexually active young women knew that their last partner was married, and 28% knew that the last partner had other partners. Thirty eight young women (5%) reported genital discharge over the past year, and 9 (1%) reported a genital ulcer. Only 23% of those who suffered STD symptoms attended a trained health worker and none stopped sexual activity or reported additional condom use.

As with male youth, a very low number (7%) of young women identified having fewer partners as a way of protecting themselves from HIV infection, but 62% responded that being faithful to one partner as a prevention method. Only 50% included abstinence as an HIV prevention method and 84% stated that a healthy looking person could be infected with HIV.

One quarter (25%) of young women respondents reported risky sex in the past year, and condoms were used in the last sex in 73% of those respondents.

2.8.2. Nigeria (34):

The 1999 Nigeria HIV sentinel surveillance survey revealed an estimated HIV seroprevalence of 5.4% in pregnant women attending antenatal clinic. This places Nigeria into the category of a generalised HIV epidemic, with appropriate surveillance needs. Under the second generation HIV surveillance guidelines, produced by WHO and UNAIDS, these needs include behavioural surveillance, in order to obtain maximum explanatory power for trends in the epidemic in Nigeria.

2.8.2.1. Male In-School Youth (34)

Eighteen and nineteen year-old male youths who were never married and not living with a sexual partner were surveyed in the three sites in the South West, North, and South East of Nigeria.

The comprehensive knowledge of HIV/AIDS remains low, at under 10% able to name three HIV prevention methods and correctly identify commonly held false beliefs about HIV and AIDS.

Thirty three percent (33%) of male youth in Ekiti reported previous sexual intercourse, 15% in Katsina and 26% in Enugu. Of those who reported previous intercourse, the median age at first intercourse was 16 years in Ekiti, 17 years in Katsina and 15 years in Enugu.

Reports of sexual activity in the previous six months were 16% in Ekiti, 6% in Katsina and 9% in Enugu. The corresponding reported condom use at last sex were 50%, 32% and 69% in Ekiti, Katsina and Enugu respectively.

The percentage of young men who reported more than one partner in the past 6 months was highest in Katsina, at 4% compared to 2% in both Enugu and Ekiti.

This means that in Katsina two-thirds of those who reported having sex in the last six months had more than one partner.

The percentage of young men reporting STI symptoms in the last year were 2% in Ekiti, 1% in Katsina, but 8% in Enugu.

2.8.2.2. Female In-School Youth (34)

Eighteen and nineteen year-old female youths who were never married and not living with a sexual partner were surveyed in the three sites in the South West, North, and South East of Nigeria.

The indicators relating to comprehensive HIV/AIDS knowledge were 11% in Katsina and Enugu, but extremely low at 3% in Ekiti.

Only six percent (6%) of young women in Katsina had made their sexual debut by the time of interview, compared with 23% and 25% in Ekiti and Enugu respectively. The overall percentage of young women reporting sex in the previous 6 months was under 10%, with differences in the same proportion as before. For the minority who had ever had sexual intercourse by the time of the interview, the median ages at first sex were 16 years in Katsina and Enugu, and 17 years in Ekiti.

Response levels to the question on condom use at the last sex act were poor, with a high-non-response rate (60%), and with less than 40% of those who responded reporting condom use.

Less than 1% (11/1285) of young women reported more than one partner in the last 6 months. Four percent (4%) of young women in Ekiti and Katsina reported symptoms

which could have been related to sexually transmitted infection, compared with 14% in Enugu. The percentage seeking treatment from an approved clinic (doctor or trained nurse) was universally low.

2.8.3. Ghana (35):

It is widely accepted that the vast majority of adult HIV infections in sub-Saharan Africa, including Ghana, are contracted through heterosexual intercourse. Since 1990, a system of HIV sentinel sero-surveillance was instituted by the Ministry of Health to complement individual studies of HIV prevalence and the passive AIDS case reporting system. These studies have found an increasing epidemic of HIV infection, spreading to the general Ghanaian population. HIV prevalence has increased among STD clinic patients from 2 percent in 1988, to nearly 9 percent in 1991, and 27% in 1998. HIV prevalence among sex workers tested in Accra was 73% in 1997.

In the general population, HIV prevalence among pregnant women has also steadily increased. In Accra, HIV prevalence at Adabraka ranged from 1% to 4% between 1995 and 1999, mirroring the rate among the Ghanaian population nationally. Outside of Accra, in both Kumasi and Agomenya, HIV prevalence was found to be considerably higher, increasing from 10% to 13% between 1995 and 1998 before reducing to 8% in 1999 in Agomenya.

While data since 1998 have shown apparent declines in HIV prevalence, it is unclear if this trend is due to improvements in the epidemic or increases in HIV-related mortality, migration from hard-hit areas, or reduced use of antenatal clinics due to reduced fertility or economic impact.

2.8.3.1. Young Men (35)

High risk behaviour in male youth was related to increased age, regular consumption of alcohol and ever having used drugs. Reported STDs in the past year were extremely high with 18% stating that they had a urethral discharge, and 11% a genital ulcer, in the past year. Those young men who reported an STD were more likely to have had sex with a commercial partner, and to report unprotected sex with a commercial or non-regular

partner. Almost half of the young men had sex in the past six months, and only just over half of those used a condom at last sex.

2.8.3.2. Young Women (35)

Almost two thirds of young women had made their sexual debut, and under half (40%) used a condom at last sexual contact. Young women from Agomenya had sex younger, had more recent sexual contacts, and used condoms less often. Young women reporting an STD were also more likely to report recent unprotected sex with a commercial or non-regular partner.

Those young women who had a close friend or relative infected or died of AIDS were more likely ever to have had sex, or had unprotected sex in the previous 6 months. The potential benefits of inclusive interventions which address both prevention and care are clear. The variables which were found to correlate with reported unprotected sex in young women included decreased years of schooling, living away from home and regularly consuming alcohol.

3. Objectives:

3.1. General objective:

- To assess HIV/AIDS/STIs knowledge, attitude, behaviour and practice among university students in Sudan during 2004.

3.2. Specific objectives:

3.2.1. To assess knowledge about HIV/AIDS/STIs and its preventive measures among university students in Sudan during 2004.

3.2.2. To identify levels of HIV risk factors among university students in Sudan during 2004.

3.2.3. To estimate prevalence of STIs and assess STI care-seeking behaviour among university students in Sudan during 2004.

3.2.4. To assess levels of HIV related stigma among university students in Sudan during 2004.

3.2.5. To identify the best channels for information/ education /communication (IEC) programs for university students in Sudan during 2004.

Chapter Two

Material and Methods

2.1. Study design:

This is a descriptive cross-sectional study mainly concerned with knowledge, attitude, practice and behaviour (KAPB) among university students in 10 states of the country.

2.2. Study area:

All universities in 10 states of the country, namely: Khartoum, Red Sea, Kassala, El Gadarif, El Gezira, White Nile, North Kordofan, South Kordofan, South Darfur and Bahr El Jebel.

The choice of these 10 states out of 26 was based on the set priorities by SNAP to initiate behavioural surveillance among university students in the country and according to the strategic plan of SNAP. BSS will be gradually expanded in other states.

2.3. Study population:

The choice of respondent groups in BSS is determined by two factors (26):

1. The state of HIV epidemic in the country
2. The prevention effort that is either underway or planned.

In generalized epidemics, the behaviours of greatest interest are those of the majority. Household surveys of risk behaviour in the general population are therefore recommended.

Countries with concentrated epidemics, where HIV is concentrated in defined sub-populations, the bulk of behavioural surveillance should consist of BSS in these groups.

In countries with low-level epidemics, behavioural surveillance should be restricted to groups identified with high risk behaviours.

In addition to epidemiological grounds, prevention efforts play great role in determining groups for BSS. While social circumstances may affect behaviour, the primary engine for behavioural change should be HIV prevention efforts. Thus, there is no point setting BSS unless a change in behaviour is expected.

In Sudan, among the vulnerable groups identified for HIV infection are university students. In addition, SNAP has already launched an HIV prevention intervention among university students in partnership with Ministry of Higher Education. BSS will help

monitor trends of behaviour over time in HIV prevention interventions among university students, and readjustment of intervention if necessary.

Therefore, the study population are all university students in the above-mentioned 10 States.

2.4. Sampling:

2.4.1. Sample Frame:

The sample frame is the university student in the 10 states: Khartoum, Red Sea, Kassala, El Gadarif, El Gezira, White Nile, North Kordofan, South Kordofan, South Darfur and Bahr El Jebel.

2.4.2. Sampling Technique:

To conduct behavioural survey among university students in the 10 states, a stratified cluster sampling technique was used. The cluster was defined as class of students in a college e.g. second year engineering students, fifth year veterinary students etc. A list of clusters in each state was generated with the size of each cluster. The number of clusters from each state is determined by the density of university students compared to the total number of students in the 10 states. Then clusters were stratified into public (government) and private universities.

During the first stage, clusters were chosen. The probability of a certain cluster to be chosen depends on its size; the larger the size of the cluster, the greater its probability for being included in the sample i.e. probability proportional to size (PPS).

During the second stage, a fixed number of respondents i.e. 20 students were chosen by simple random selection (**See Annexes 1 and 2).**

2.4.3. Sample Size:

For the behavioural survey among university students, the sample size was determined using the formula (30):

$$n = \frac{D\left[Z_{1-\alpha}\sqrt{2\tilde{P}(1-\tilde{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1) + P_2(1-P_2)}\right]^2}{(P_2 - P_1)^2}$$

Where:

n = sample size.

D = design effect.

P_1 = the estimated proportion at the time of the first survey.

P_2 = the target proportion at some future date, so that $(P_2 - P_1)$ is the magnitude of change we want to be able to detect.

$\tilde{P} = (P_1 + P_2) / 2$

$Z_{1-\alpha}$ = the z-score corresponding to the desired level of significance.

$Z_{1-\beta}$ = the z-score corresponding to the desired level of power.

Estimating D = 2, at 95% level of significance $Z_{1-\alpha} = 1.645$, at the desired level of power 90% $Z_{1-\beta} = 1.282$, estimating P_1 0.50 (because this is the initial BSS round and this value yields the maximal sample size at the desired level of significance and power) and setting the desired level of change in behaviour to be detected at 10% i.e. $P_2 = 0.4$, then the desired sample size will be 841. This will be rounded to 900 to compensate for non-respondents.

2.5. Data collection, analysis and interpretation:

2.5.1. Data collection methods:

- Cross-sectional survey

2.5.2. Data Collection Tools:

- Structured pre-coded questionnaire: the standard Family Health International (FHI) BSS questionnaire was adapted and tested guided by the behavioural survey guidelines and questionnaire used in strategic planning process (SPP) in Sudan during 2002.

The questionnaire was divided into 5 sections with an introduction about the interviewer and the survey, assuring confidentiality and anonymity of the questionnaire and seeking consent of the respondent (**See Annex 3).**

2.5.2.1. Section I: demographic data:

The demographic data included: state, gender, age, occupation, income sources, marital status, number of children and number of marital partners.

2.5.2.2. Section II: knowledge about HIV/AIDS, behaviours and attitudes:

The following information were obtained regarding knowledge, behaviour and attitude: hearing about AIDS, knowledge about HIV and its routes of transmission, misconceptions about HIV transmission, symptoms associated with AIDS, knowledge about HIV preventive measures, attitudes towards people living with HIV/AIDS (PLWHA), exposure to HIV testing and results, use of syringes and blades.

2.5.2.3. Section III: sexual behaviour, knowledge and use of condoms:

The section about sexual behaviour and condoms included the following: knowledge about condom, sources where people get condoms, ever use of condom, use of condom during last sexual intercourse, sexual activity, factors pushing for sexual activity, age at first sexual intercourse, number of sexual partners, homosexuality and heterosexuality, sexual relationships of partners.

2.5.2.4. Section IV: STIs and care-seeking behaviour:

This section included questions about: suffering an episode of STI during last year, duration of STI episode, care-seeking behaviour during an STI episode, sexual activity and condom use during STI episode.

2.5.2.5. Section V: information and communication channels:

The data obtained regarding information and communication channels included: accessible mass media channels (Radio, TV), favourite time and programmes in Radio and TV, use of printed IEC materials, preferred communication channel for HIV/AIDS education.

2.5.3. Data Analysis:

Data were entered and analysed using SPSS computer software.

2.6. Study variables:

- Social and demographic profile.
- Knowledge of HIV prevention methods.
- HIV/AIDS related stigma and discrimination.
- Misconceptions about HIV transmission.
- Median age at first sex.
- Respondents with multiple partners.
- Number of sexual partners among respondents.
- Condom use at last sex.
- STI care-seeking behaviour.
- Exposure to interventions.

2.7. Ethical considerations:

Research in HIV/AIDS is sensitive and needs cautious attention to ethical rights of subjects to be involved in the study. This complexity is largely due to the nature of HIV/AIDS, privacy of sexual behaviours, social stigma and discrimination. Therefore, confidentiality and informed consent were ensured before any subject was enrolled in the study.

The research proposal was submitted to the ethical review committee in Federal Ministry of Health. It was reviewed and ethical clearance certificate was obtained (**See Annex 4).**

Interviewers were trained to explain to eligible subjects the purpose of the survey as well as the measures taken to ensure confidentiality and privacy so as to get verbal consent from them. Names and identification marks were not written on respondents' questionnaires. The right of those who chose not to participate in the study was respected, and they were thanked for their time.

2.8. Study Limitations:

Validity of self-reported data about sex (26):

It is not possible to validate data on sexual practices by direct observation. It is, however, possible to triangulate them with data from other sources to see if the picture presented is consistent and credible. An increasing number of studies comparing self-reported sexual

behaviour with biological markers of sexual activity such as pregnancy, STIs and HIV infection show that at an individual level there is quite a good match between the reported risk behaviour and biological indicators of risk. Still, some misreporting of risk behaviour undoubtedly occurs, and true levels of risk may well be underreported, especially by women among whom extramarital sex is more heavily stigmatized than it is among men.

However, tracking the HIV epidemic may be less concerned with the exact level of risk behaviour in a population than they are with trends in those behaviours over time. Even where there is misreporting, repeat behavioural surveys will show changes in trends over time, provided that the magnitude or direction of misreporting do not change significantly.

Sample size is not representative for each state separately:

Due to limited resources, this survey was conducted as one study for the 10 states. Ideally, each state should be considered as a separate survey and representative sample size to be taken accordingly. This will allow generalization of results at the state level as well as comparison of findings in different states.

Chapter Three

Results

3. RESULTS:

3.1. Socio-demographic profile:

One thousand one hundred thirteen university students from 10 states were interviewed during the period August to December 2004. More than two thirds of them resided in Khartoum State (Table 3).

Half of the students 560 (50.3%) were females while the other half 553 (49.7%) were males (Figure 2).

Age distribution of the university students is shown in Table 4. Two hundred ninety eight students (26.8 %) were less than 20 years old, 453 (40.7 %) were between 20 - 22 years old, while 362 (32.5 %) were above 22 years old.

The majority of the students interviewed, 1078 (96.9%), were not working while 19 (1.7%) were teachers, 7 (0.6%) were casual workers, 7 (0.6%) were uniformed forces and 2 (0.2%) were clerks (Figure 3).

Figure 4 shows that 239 (21%) students have other income sources while 874 (79%) don't have other income sources.

The vast majority of the students, 1062 (95.4%), had never married and 47 (4.2%) were married. Negligible percentages were divorced (0.2%), widowed (0.1%) or separated (0.1%) as shown in Figure 5.

Out of 51 who ever married, 20 (39.3%), had no children, 11 (21.6%) had one child, 5 (9.8%) had two children and the rest had 3 or more children (Table 5).

Nine (18%) of the married university students had more than one wife and the rest, 42 (82%) had one wife (Figure 6).

3.2. HIV/AIDS knowledge, behaviour and attitude:

Only 3 (0.3%) of the university students never heard about AIDS (Figure 7). The major sources of hearing about AIDS were displayed in Table 6; TV: 836 (75.1%), Radio: 723 (65.0%) and newspapers: 520 (46.7%).

Severe weight loss was the commonest AIDS symptom and was identified by 629 university students (56.5%) as reflected in Table 7.

Eight hundred fifty six students (77.1%) identified the causative agent of AIDS as virus, while 237 (21.4%) didn't know the nature of the agent that causes AIDS (Figure 8).

Figure 9 shows knowledge of students about asymptomatic HIV infection. Nine hundred forty six students (85.2 %) managed to correctly identify that HIV infected person may look healthy, while 126 (11.4%) think that HIV infected person look ill. There was no statistically significant difference between males and females regarding knowledge about asymptomatic HIV infection. However, there was statistically significant difference between different age groups regarding their knowledge about asymptomatic HIV infection ($P < 0.05$), i.e. knowledge was better among older age groups (Table 8).

Knowledge about HIV mode of transmission was displayed in Table 9. Sexual intercourse was the commonest HIV mode of transmission identified by university students: 1041 (93.8%), followed by contaminated blood and blood products: 921 (83.0%). Only 329 (29.6%) students identified mother to child transmission of HIV. Knowledge about sexual transmission of HIV was not related to gender i.e. there was no statistically significant difference between males and females regarding their knowledge about sexual transmission of HIV. However, the difference was statistically significant between different age-groups regarding their knowledge about sexual transmission of HIV ($P < 0.05$) i.e. students in older age groups has better knowledge (Table 10). There was statistically significant difference between males and females regarding their knowledge about blood transmission of HIV ($P < 0.05$), while the difference was not statistically significant between different age-groups (Table 11).

Knowledge about HIV preventive measures was weak. Only 299 students (26.9%) identified faithfulness and 136 (12.2%) students identified condom use as HIV preventive measures. Avoiding illegal sexual relationships and sharing of skin piercing instruments were better identified by students as HIV preventive measures, 81.4 % and 70.8% respectively (Table 12). There was statistically significant difference between males and females and between different age-groups regarding knowledge of condom as HIV preventive measure, ($P < 0.05$), i.e. knowledge was better among males and older age groups (Table 13).

Misconceptions about HIV transmission were still there; with 191 students (17.2%) mentioned mosquito bite as route of HIV transmission and 117 students (10.5%) mentioned eating with infected person would transmit HIV infection (Figure 10).

The majority of the students, 936 (84%), would accept nursing a relative with HIV/AIDS, while 174 (16%) would not accept doing that (Figure 11).

Around one fourth of the students (256) would not accept eating with HIV infected person (Figure 12). Gender is statistically significantly related with this tendency ($P< 0.05$) and females were more likely to refuse eating with HIV infected people, while age was not statistically significantly related with acceptance of eating with HIV infected people (Table 14).

When asked about schooling of HIV infected children, 830 (74.8 %) indicated that they should continue schooling like other children and 222 (20 %) mentioned they should not go to school to prevent HIV infection of other children at school (Figure 13).

Three fourths of the students (861) mentioned that HIV infected teachers may continue their work in schools, while 201 (18.1%) mentioned that HIV infected teachers should be stopped from teaching to prevent HIV transmission at school (Figure 14).

Two thirds of university students (732) would not accept buying food from HIV infected person as shown in Figure 15. There was statistically significant difference between males and females and between younger and older age-groups regarding refusal of eating with HIV infected person ($P< 0.05$), (Table 15).

Tendency to hide HIV infection of a family member was displayed in Table 16. Around one half of students (531) would tend to hide HIV infection of a family member, while the other half (532) would not hide HIV infection of their family members.

Eighty one students (7%) experienced HIV testing (Figure 16). Only 23 (28%) of them tested voluntarily, while the rest 58 (72%) were requested to test (Figure 17). Seventy four students (91.4%) of those tested for HIV were not infected and the rest, 7 (8.6%), didn't know the results of their tests (Table 17).

A considerable number of students, 342 (30.7%), shared blades with others, and 53 (4.8%) students shared needles with others (Table 18).

3.3. Sexual behaviour, knowledge and use of condoms:

Just below one third of students (313) never heard about or see condom, 494 (44.4%) students heard about condom and 306 (27.5%) heard about and saw condom (Figure 18).

The commonest source of hearing about condom were friends and peers 319 (39.9%),

printed materials 161 (20.1%) and relatives 160 (20.0%). Other sources were TV, pharmacies and family planning clinics (Table 19).

The commonest source where university students may get condoms was pharmacies 516 (64.5%). Other sources were family planning clinics, hospitals, friends and peers (Table 20).

Only 52 (6.5%) students ever used condoms (Figure 19). Condom use was more likely among males compared to females and among students with other income sources compared to those with no other income sources ($P < 0.05$). Condom use was not statistically significantly different across different age groups, (Table 21).

The majority of students who ever used condom did so for contraception 30 (57.7%) and to prevent HIV infection 28 (53.8%). Other reasons for condom use were STIs prevention and request by sexual partners (Table 22).

The majority of university students, 975 (87.6%), never practised sex, 77 (6.9%) were practising sex at the time of the survey and 61 (5.5%) practised sex before marriage or in the past (Table 23).

The majority of those who practised sex started their sexual experience at the age of 15-17 years (37.7%). Forty three students (31.2%) started their first sexual experience at 18-20 years old and 34 (24.6%) at 12-14 years old. The median age at first sexual intercourse was found to be 16 years and the mean 16.5 ± 3 years (Table 24).

One half of sexually active students (67) had one sexual partner, 20 (14.5%) had 2 sexual partners, 15 (10.9%) had 3 partners and around one fourth (32) had more than 3 sexual partners. Four students (2.9%) refused to answer the question (Figure 20).

The factors pushing university students to practice sex were shown in Table 25. Three fourths of the students (100) practiced sex for enjoyment. Influence of friends and peers was mentioned as the pushing factor for practising sex by 21 students (15.2%).

More than two thirds of sexually active students (96) assumed that their partners didn't practise sex with others. Nineteen students (13.8%) agreed that their sexual partners practise sex with others (Table 26).

Only five students (3.6%) used condom consistently, 33 students (23.9%) used condom during last sexual intercourse and 86 students (62.4%) never used condom (Table 27).

3.4. STIs and care-seeking behaviour:

The estimated prevalence of major STIs syndromes among university students during the last 12 months was displayed in Table 28. Seventeen male students (3.1%) suffered episode of urethral discharge during last 12 months, 46 female students (8.2%) had vaginal discharge and 15 students (1.3%) had genital ulcer. The duration of STIs episodes was mostly short, less than one year, as indicated by the majority of those who suffered STIs during the last year (83.3%), (Table 29).

The attitudes of university students during STIs episodes were shown in Table 30. The majority of students (80.8%) received medical treatment. Around one half of the students who suffered STIs (35) received medical care in governmental health units and around one third (24) received care in private clinics. Only 3 students (3.8%) received traditional treatment and 5 students (6.4%) used home remedies to treat their STIs. Condom use during STIs episode was low (5.1%). None of the students who suffered a sexually transmitted infection had informed their sexual partners about their illness, while 14% of them informed their relatives and 5% informed their friends or peers about their illness.

3.5. Information and communication channels:

The majority of students, 970 (87.2%), had access to both radio and television and only 10 students (0.9%) had neither access to radio nor television (Figure 21).

Around two thirds of the students (630) preferred listening to national radio station, one third (321) preferred state radio station and 382 (36.5%) preferred listening to international radio stations (Table 31). Out of those who listen to radio, 333 (38.4%) listen to evening programmes of the national radio station and 252 (29.0%) listen to morning programmes of the national radio station (Table 32).

Around two thirds of the students (624) preferred watching national TV, one fifth (204) preferred state TV and one half of the students (506) preferred satellite TV stations (Table 33). The preferred TV watching time was evening national TV (42.2%) and evening satellite TV (32.9%), (Table 34).

Three quarters of university students (837) were exposed to IEC interventions (Figure 22).

The preferred communication channels for HIV/AIDS education and awareness as seen by university students were: TV (62.3%), public lectures (60.0%), radio (59.4%) and printed materials (45.2%), (Table 35).

Table 3: Distribution of university students by state, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

State	Frequency	Percent
Khartoum	769	69.1
Bahr El Jebel	21	1.9
Red Sea	40	3.6
Kassala	40	3.6
El Gadarif	25	2.2
White Nile	40	3.6
El Gezeira	99	8.9
North Kordufan	40	3.6
South Kordufan	20	1.8
South Darfur	19	1.7
Total	1113	100.0

Figure 2: Gender distribution of university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

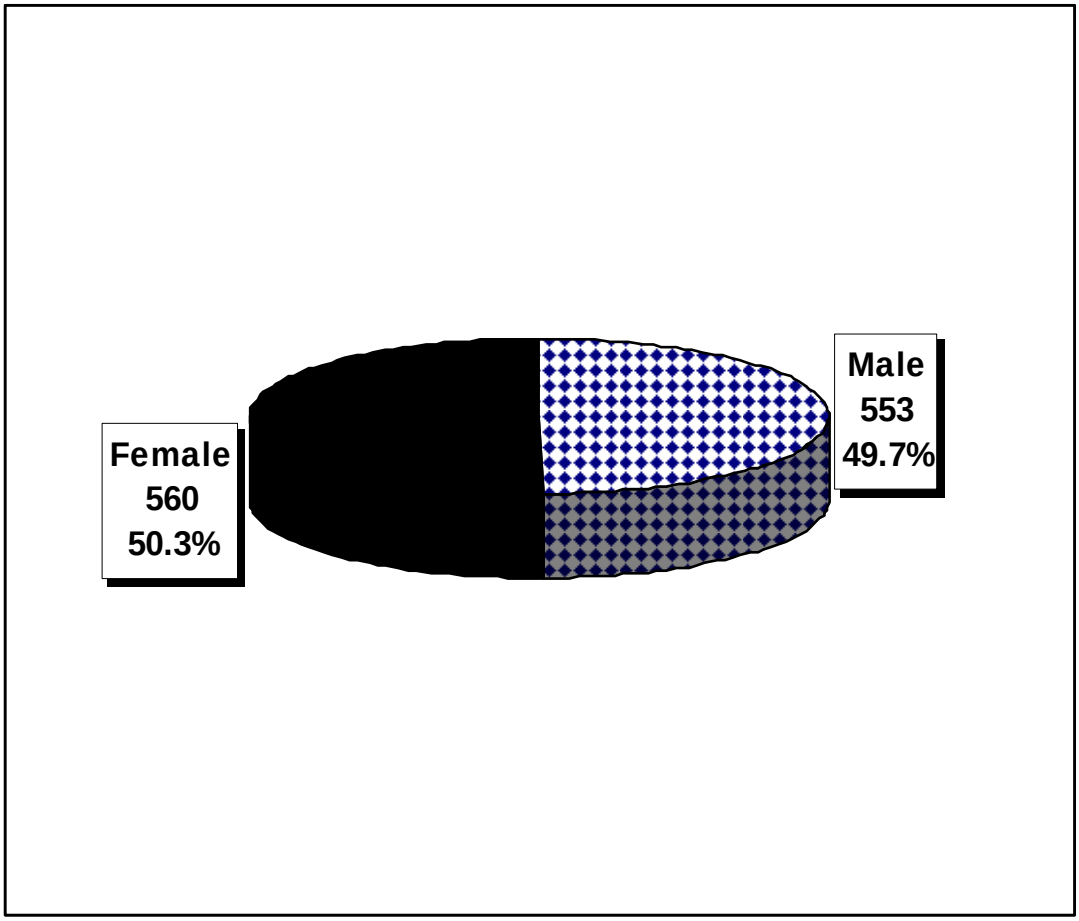


Table 4: Age distribution of university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

Age: Years	Frequency	Percent
<20	298	26.8
20-22	453	40.7
>22	362	32.5
Total	1113	100.0

Figure 3: Employment status of university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

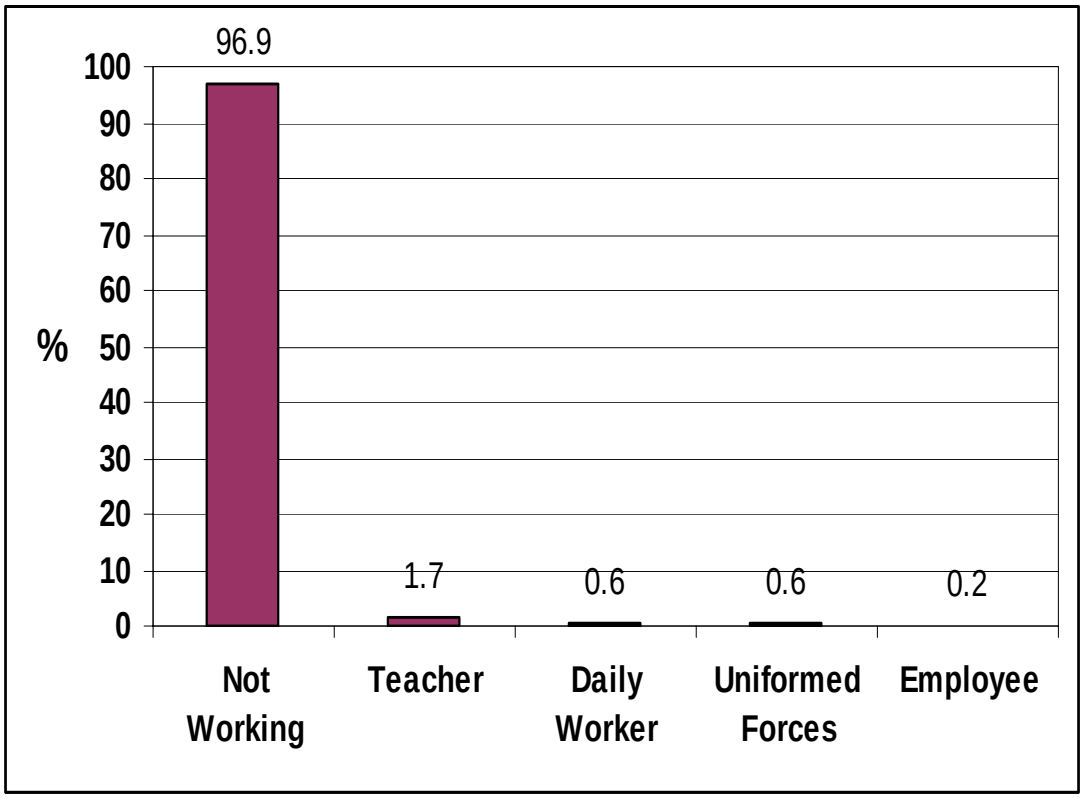


Figure 4: Income status of university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

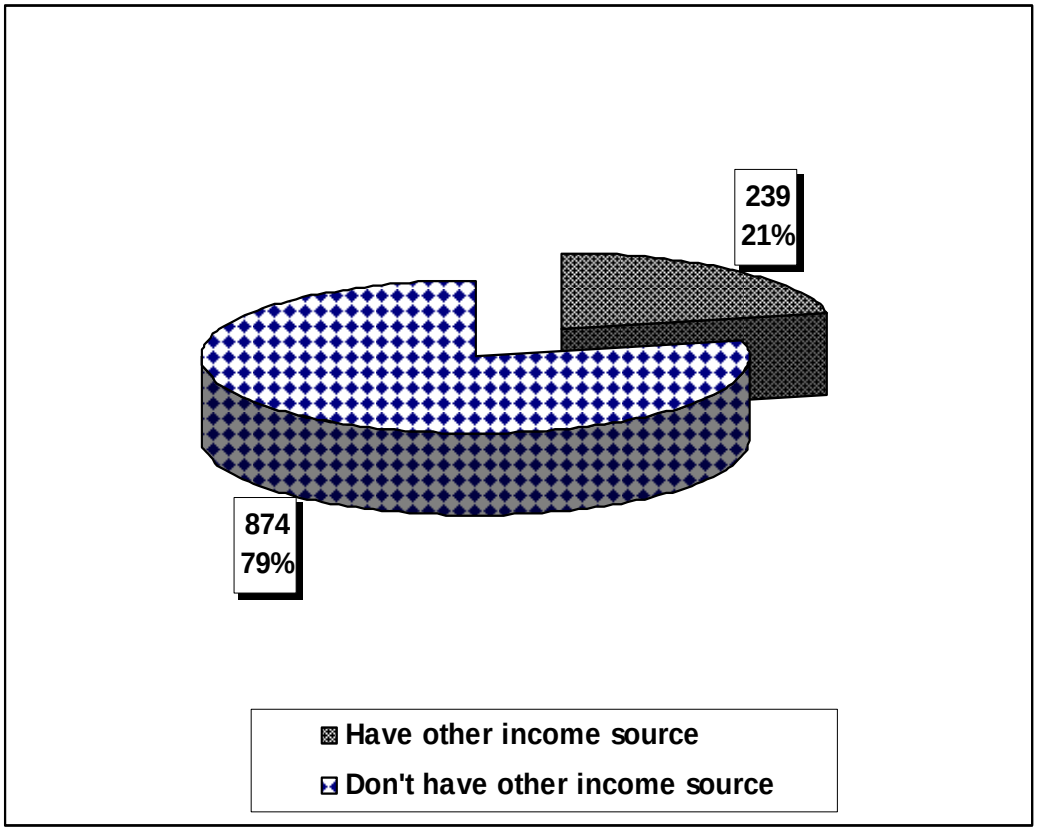


Figure 5: Marital status of university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

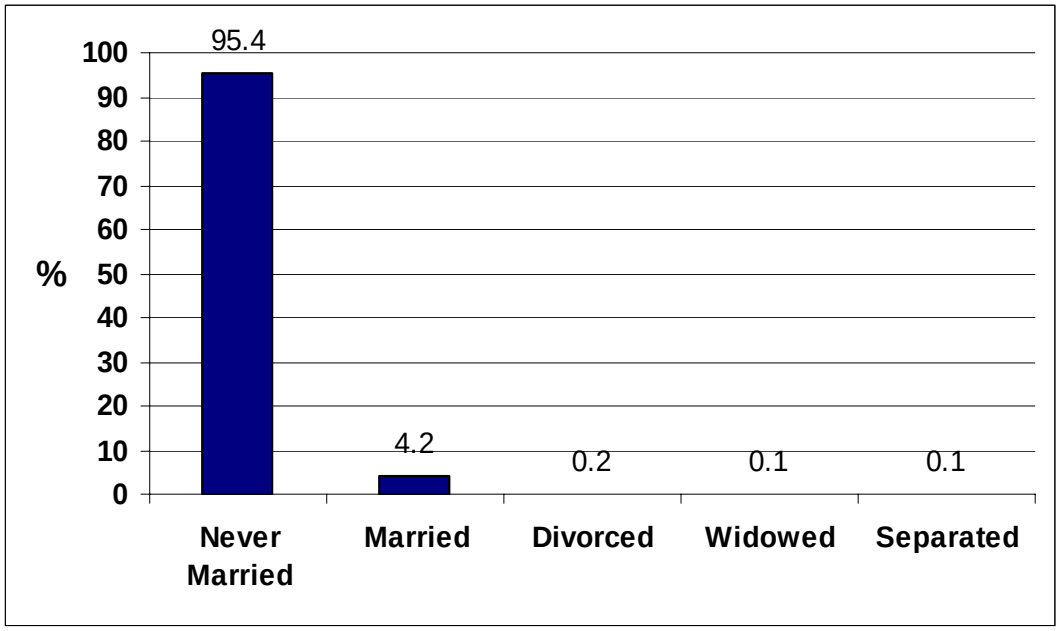


Table 5: Number of children of married university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 51)

Number of Children	Frequency	Percentage
0	20	39.3
1	11	21.6
2	5	9.8
3	4	7.8
4	4	7.8
5	3	5.9
> 5	4	7.8
Total	51	100.0

Figure 6: Number of wives of married university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 51)

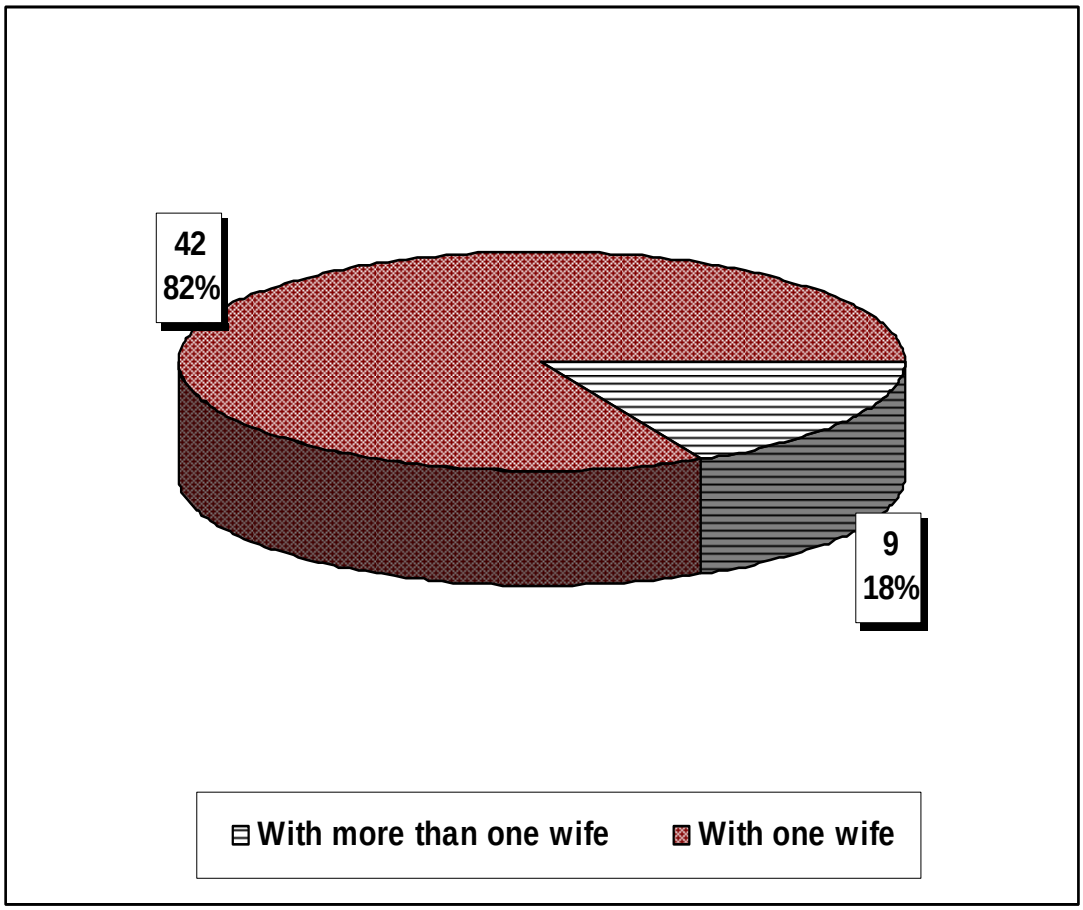


Figure 7: Hearing about HIV/AIDS among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

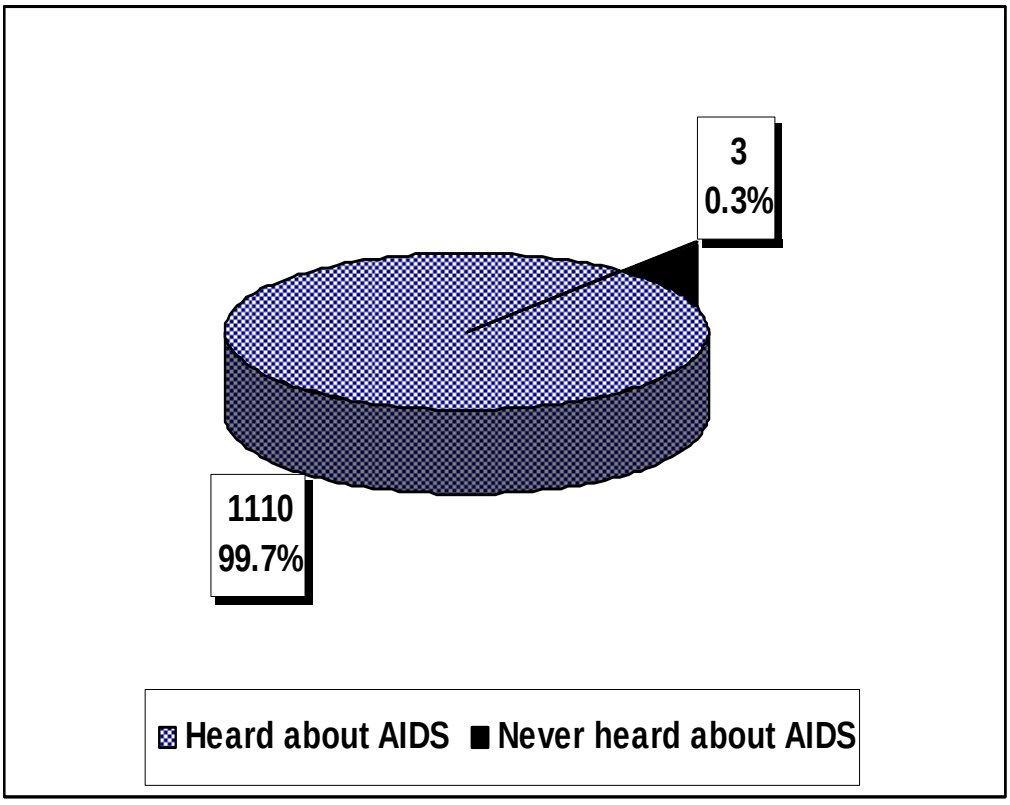


Table 6: Sources of information about HIV/AIDS among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1110)

Source	Frequency	Percentage
Radio	723	65.0
TV	836	75.1
Newspapers	520	46.7
Health Workers	271	24.3
Friends	298	26.8
Other sources	123	11.1

Table 7: Knowledge about major AIDS symptoms among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

Symptoms	Frequency	Percentage
Fever for > 1 month	374	33.6
Diarrhoea for > 1 month	323	29.0
Severe weight loss	629	56.5

Figure 8: Knowledge about AIDS causative agent among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

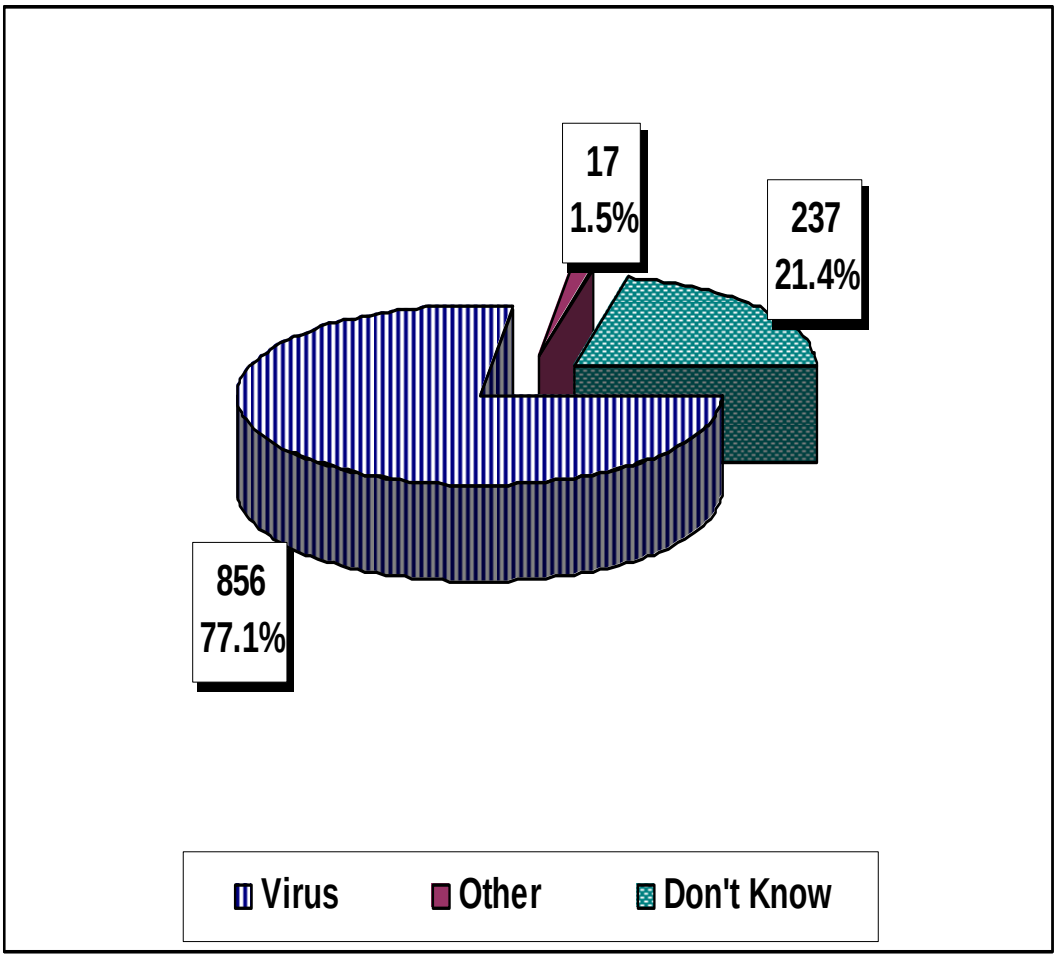


Figure 9: Knowledge about asymptomatic HIV infection among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

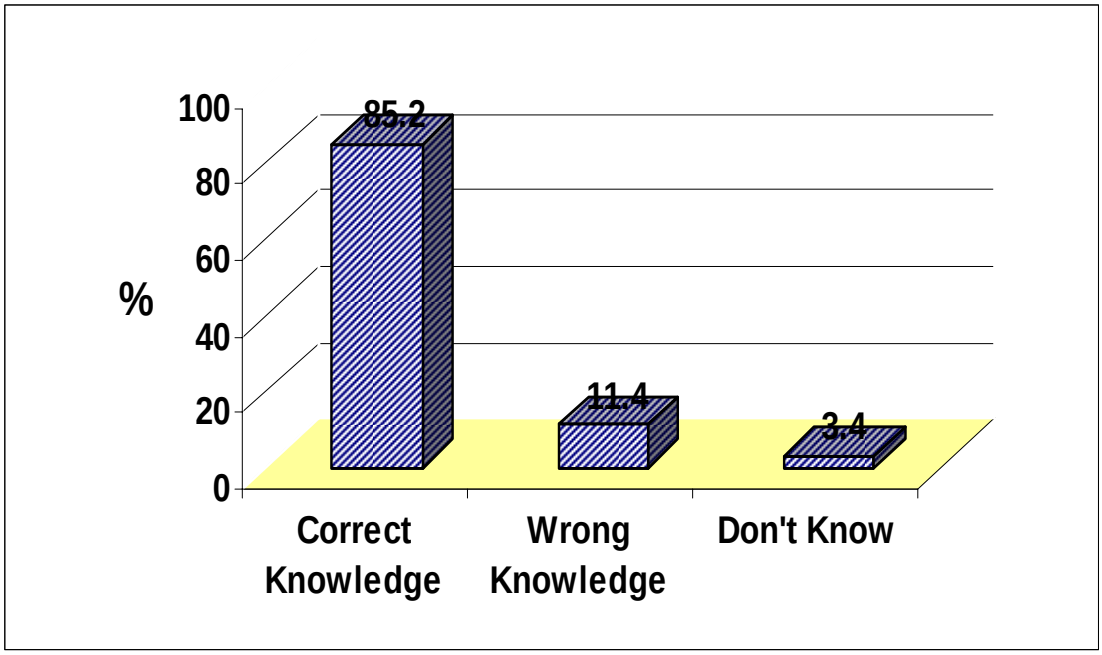


Table 8: Cross tabulation of gender and age by knowledge about asymptomatic HIV infection among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1072)

		HIV Infected Person may look healthy			P Value
		YES No. (%)	NO No. (%)	Total No. (%)	
Gender	**Male**	469 (88.5)	61 (11.5)	530 (100.0)	
	Female	477 (88.0)	65 (12.0)	542 (100.0)	
Total		946 (88.2)	126 (11.8)	1072 (100.0)	
AGE GROUPS	**<20**	237 (83.2)	48 (16.8)	285 (100.0)	**< 0.05**
	20-22	392 (89.7)	45 (10.3)	437 (100.0)	
	>22	317 (90.6)	33 (9.4)	350 (100.0)	
Total		946 (88.2)	126 (11.8)	1072 (100.0)	

Table 9: Knowledge about HIV transmission among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

Route of Transmission	Frequency	Percentage
Sexual Intercourse	1041	93.8
Contaminated Blood	921	83.0
From mother to child	329	29.6

Table 10: Cross tabulation of gender and age by knowledge about sexual transmission of HIV among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1098)

		HIV can be transmitted by sexual intercourse			**P Value**
		YES No. (%)	NO No. (%)	Total No. (%)	
Gender	**Male**	521 (95.4)	25 (4.6)	546 (100.0)	
	Female	520 (94.2)	32 (5.8)	552 (100.0)	
Total		1041 (94.8)	57 (5.2)	1098 (100.0)	
AGE GROUPS	**<20**	266 (91.7)	24 (8.3)	290 (100.0)	**< 0.05**
	20-22	431 (95.8)	19 (4.2)	450 (100.0)	
	>22	344 (96.1)	14 (3.9)	358 (100.0)	
Total		1041 (94.8)	57 (5.2)	1098 (100.0)	

Table 11: Cross tabulation of gender and age by knowledge about blood transmission of HIV among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1098)

		HIV can be transmitted via contaminated blood			P Value
		YES No. (%)	NO No. (%)	Total No. (%)	**< 0.05**
Gender	**Male**	443 (81.1)	103 (18.9)	546 (100.0)	
	Female	478 (86.6)	74 (13.4)	552 (100.0)	
Total		921 (83.9)	177 (16.1)	1098 (100.0)	
AGE GROUPS	**<20**	239 (82.4)	51 (17.6)	290 (100.0)	
	20-22	376 (83.6)	74 (16.4)	450 (100.0)	
	>22	306 (85.5)	52 (14.5)	358 (100.0)	
Total		921 (83.9)	177 (16.1)	1098 (100.0)	

Table 12: Knowledge about HIV preventive measures among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

Preventive measure	Frequency	Percentage
Being faithful to one non-infected sexual partner	299	26.9
Use of condom	136	12.2
Abandon illegal sexual intercourse	903	81.4
Avoid sharing skin-piercing instruments	786	70.8

Table 13: Cross Tabulation of Gender and Age by Knowledge about condom as HIV Preventive Measure among University Students, HIV/AIDS Behavioural Survey, Sudan, 2004 (N = 1095)

		Does condom prevent HIV infection			P Value
		YES No. (%)	NO No. (%)	Total No. (%)	**< 0.05**
Gender	**Male**	86 (15.8)	459 (84.2)	545 (100.0)	
	Female	50 (9.1)	500 (90.9)	550 (100.0)	
Total		136 (12.4)	959 (87.6)	1095 (100.0)	
AGE GROUPS	**<20**	23 (8.0)	266 (92.0)	289 (100.0)	**< 0.05**
	20-22	51 (11.4)	396 (88.6)	447 (100.0)	
	>22	62 (17.3)	297 (82.7)	359 (100.0)	
Total		136 (12.4)	959 (87.6)	1095 (100.0)	

Figure 10: Misconceptions about HIV transmission among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

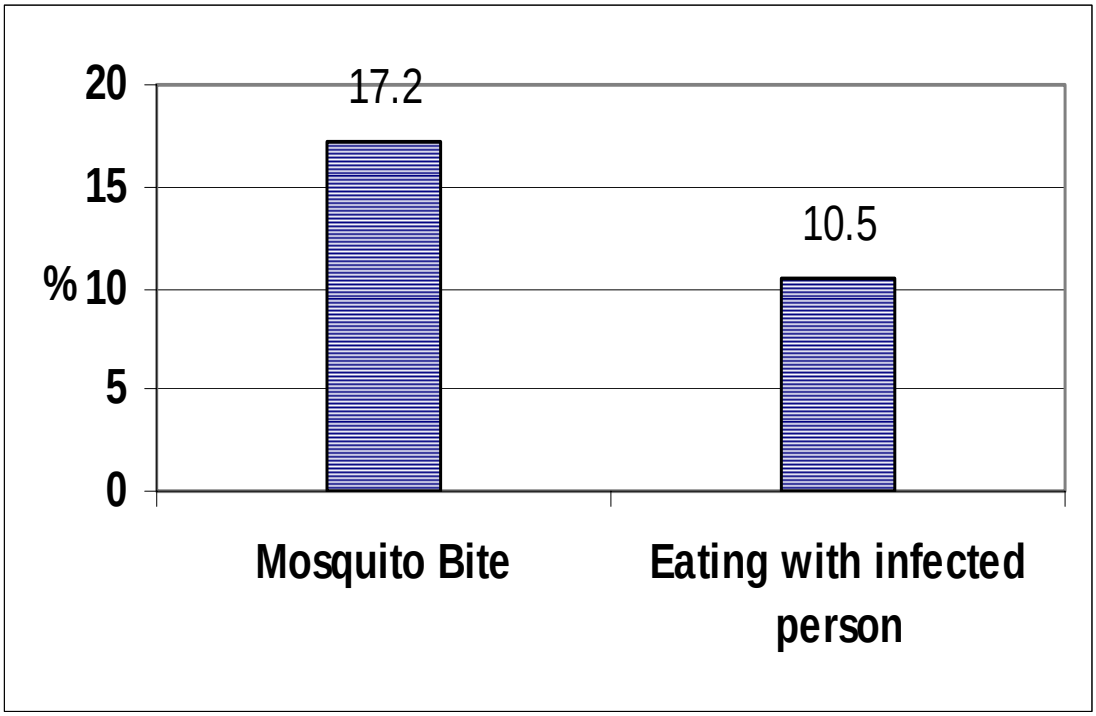


Figure 11: Acceptance of nursing a relative infected with HIV among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

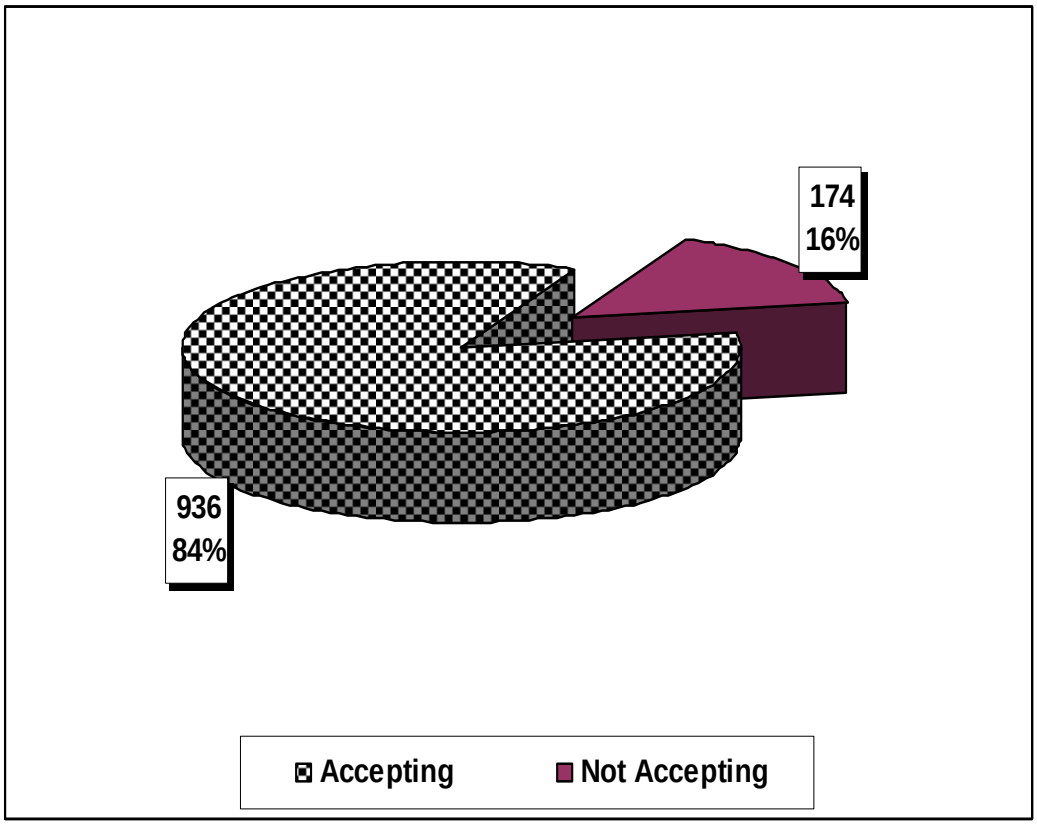


Figure 12: Acceptance of eating with HIV-infected person among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=1110)

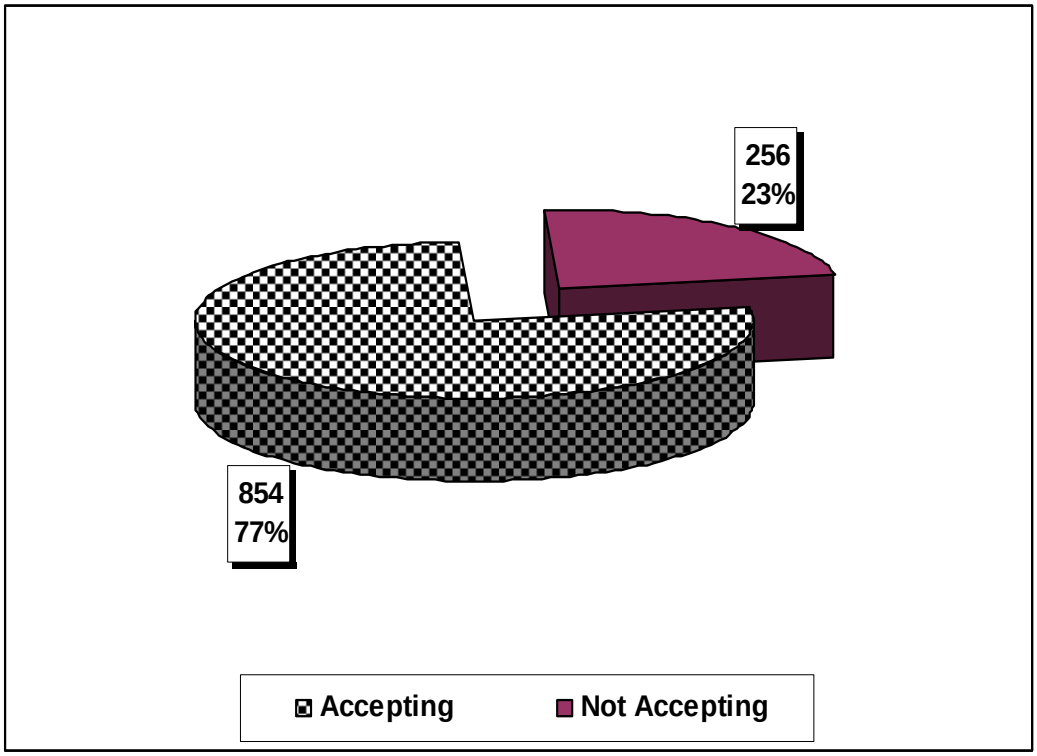


Table 14: Cross tabulation of gender and age by acceptance of eating with HIV infected person among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1083)

		Would you accept eating with HIV infected person			P Value
		YES No. (%)	NO No. (%)	Total No. (%)	**< 0.05**
Gender	**Male**	454 (84.7)	82 (15.3)	536 (100.0)	
	Female	397 (72.6)	150 (27.4)	547 (100.0)	
Total		851 (78.6)	232 (21.4)	1083 (100.0)	
AGE GROUPS	**<20**	217 (74.8)	73 (25.2)	290 (100.0)	
	20-22	341 (78.0)	96 (22.0)	437 (100.0)	
	>22	293 (82.3)	63 (17.7)	356 (100.0)	
Total		851 (78.6)	232 (21.4)	1083 (100.0)	

Figure 13: University students' attitudes towards schooling of infected students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1110)

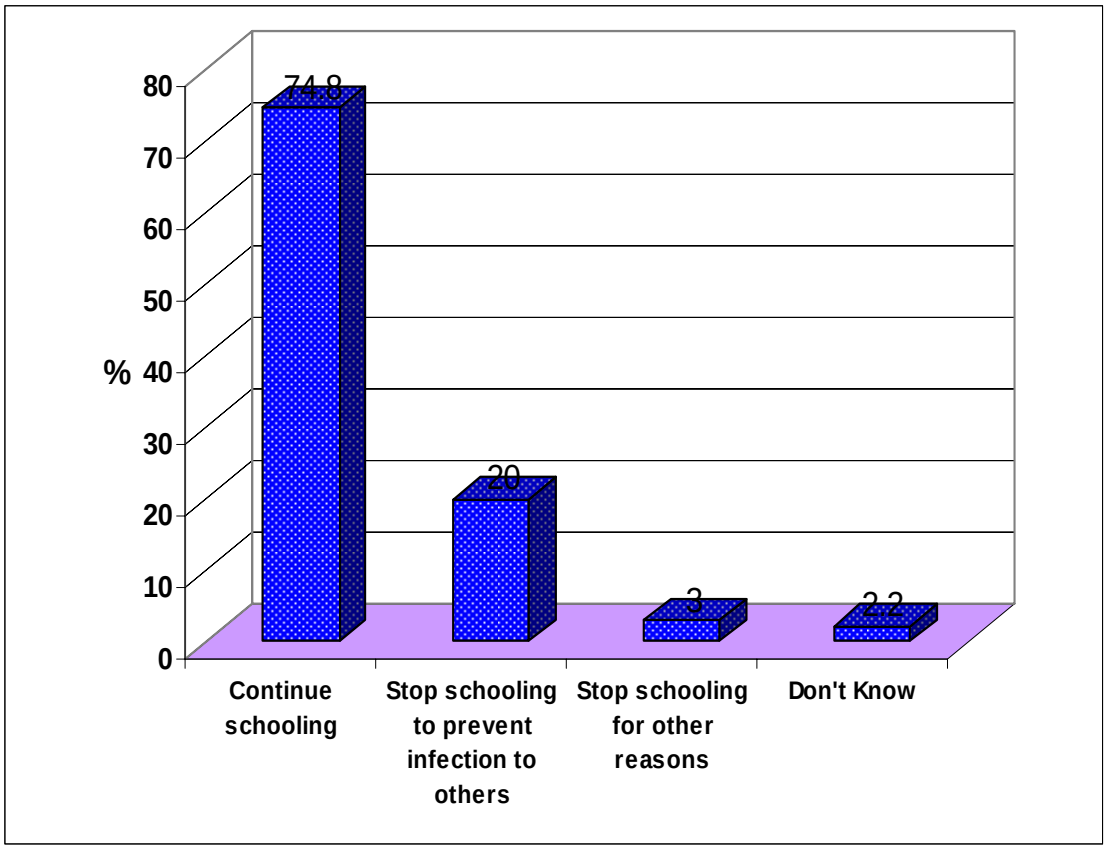


Figure 14: University students' attitudes towards HIV infected teachers, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1110)

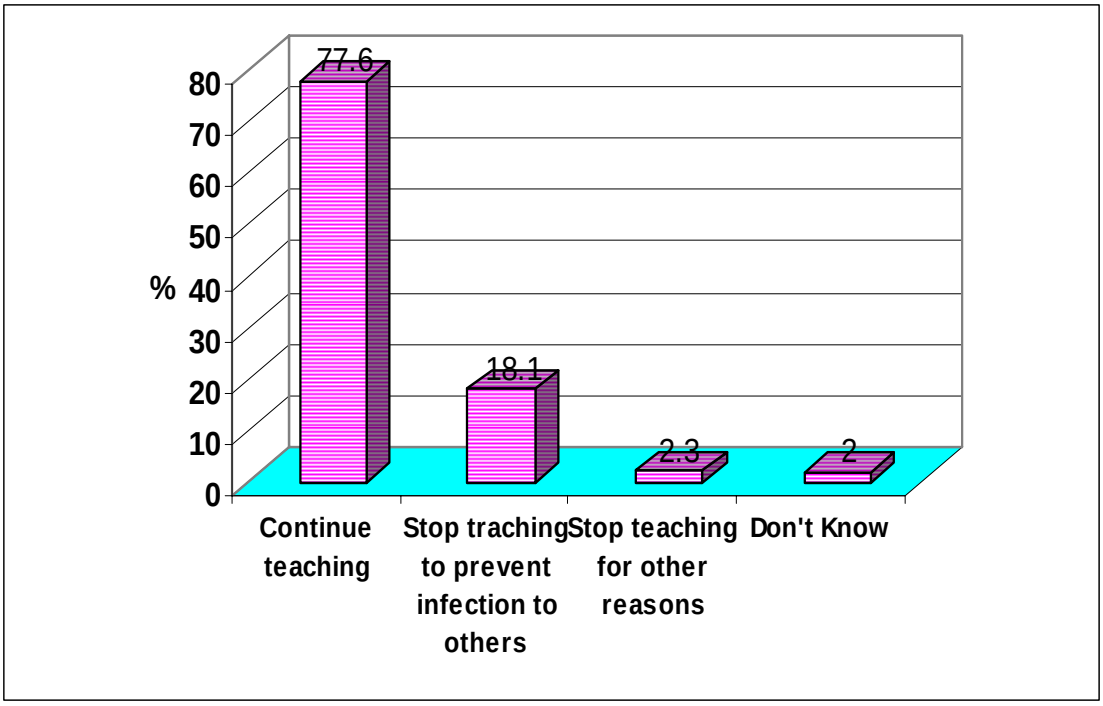


Figure 15: University students' attitudes towards buying food from HIV infected person, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1110)

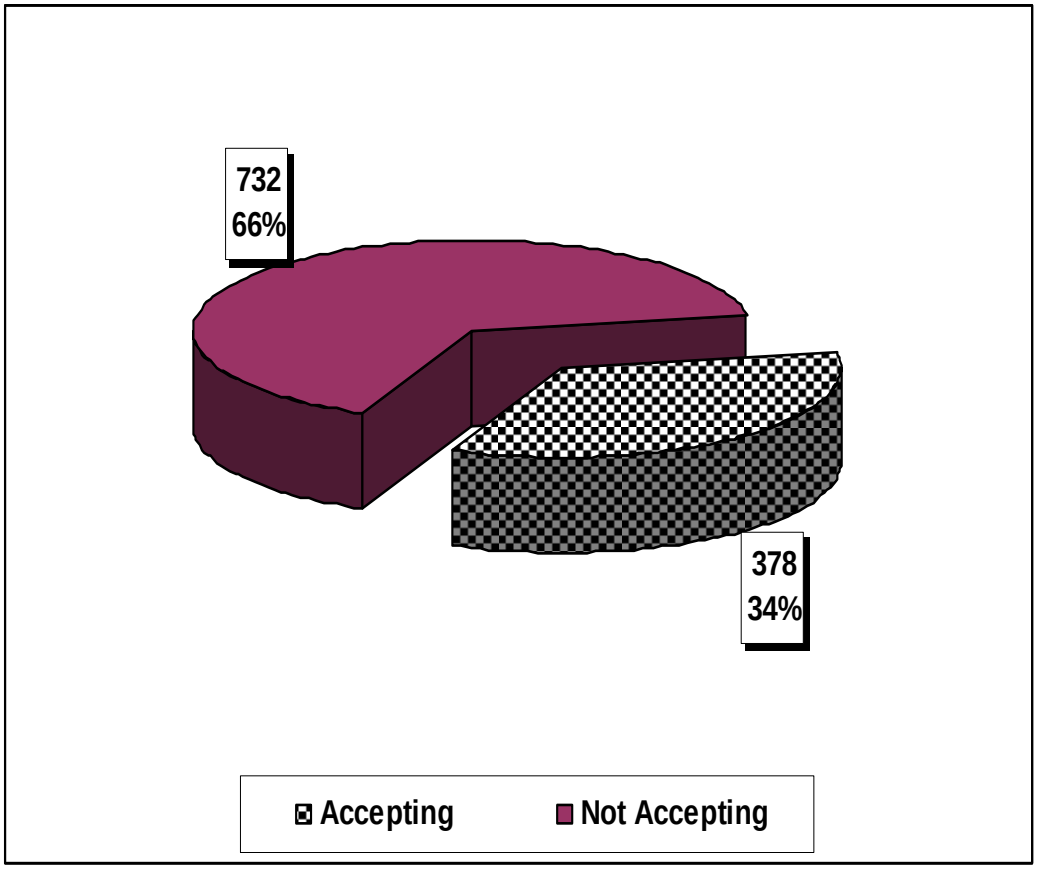


Table 15: Cross tabulation of gender and age by acceptance of buying from HIV infected person among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1083)

		Would you accept buying from HIV infected person			P Value
		YES No. (%)	NO No. (%)	Total No. (%)	< 0.05
Gender	**Male**	216 (40.1)	322 (59.9)	538 (100.0)	
	Female	162 (29.7)	383 (70.3)	545 (100.0)	
Total		378 (34.9)	705 (65.1)	1083 (100.0)	
AGE GROUPS	**<20**	87 (29.7)	206 (70.3)	293 (100.0)	< 0.05
	20-22	147 (33.7)	289 (66.3)	436 (100.0)	
	>22	144 (40.7)	210 (59.3)	354 (100.0)	
Total		378 (34.9)	705 (65.1)	1083 (100.0)	

Table 16: University students tendency to hide HIV infection of a family member, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1110)

	Frequency	Percentage
Will hide	531	47.84
Will not hide	532	47.93
Don't know	47	4.23
Total	1110	100.0

Figure 16: Exposure to HIV testing among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1110)

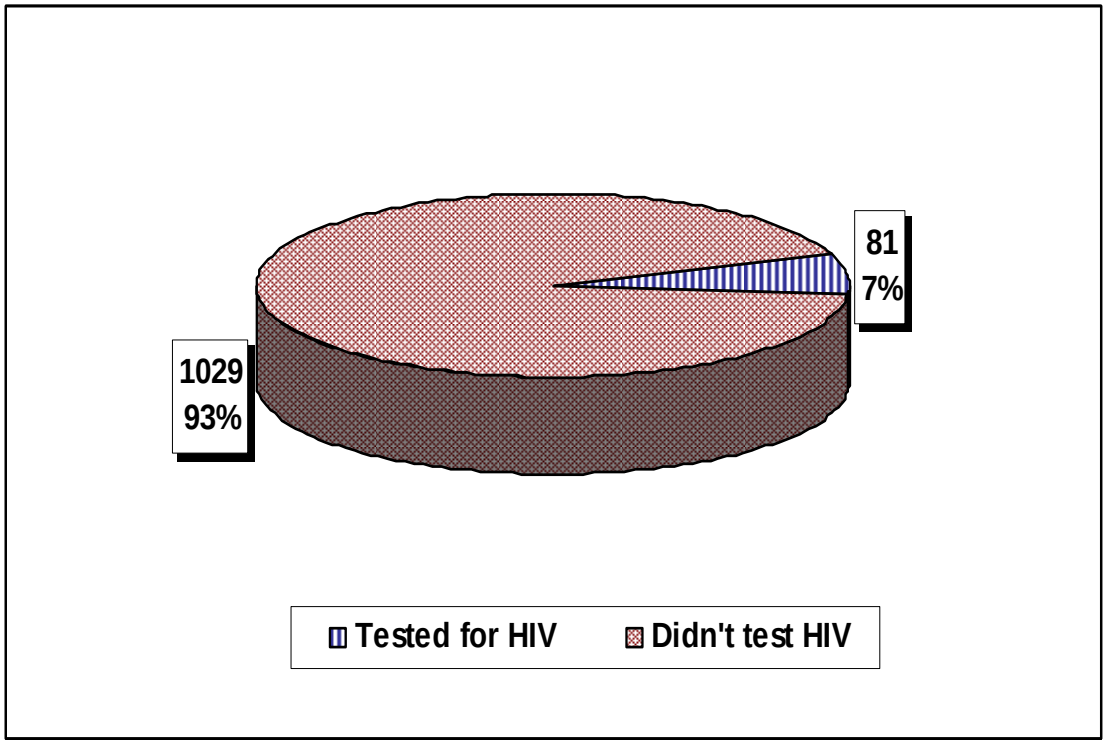


Figure 17: Reasons for HIV testing among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 81)

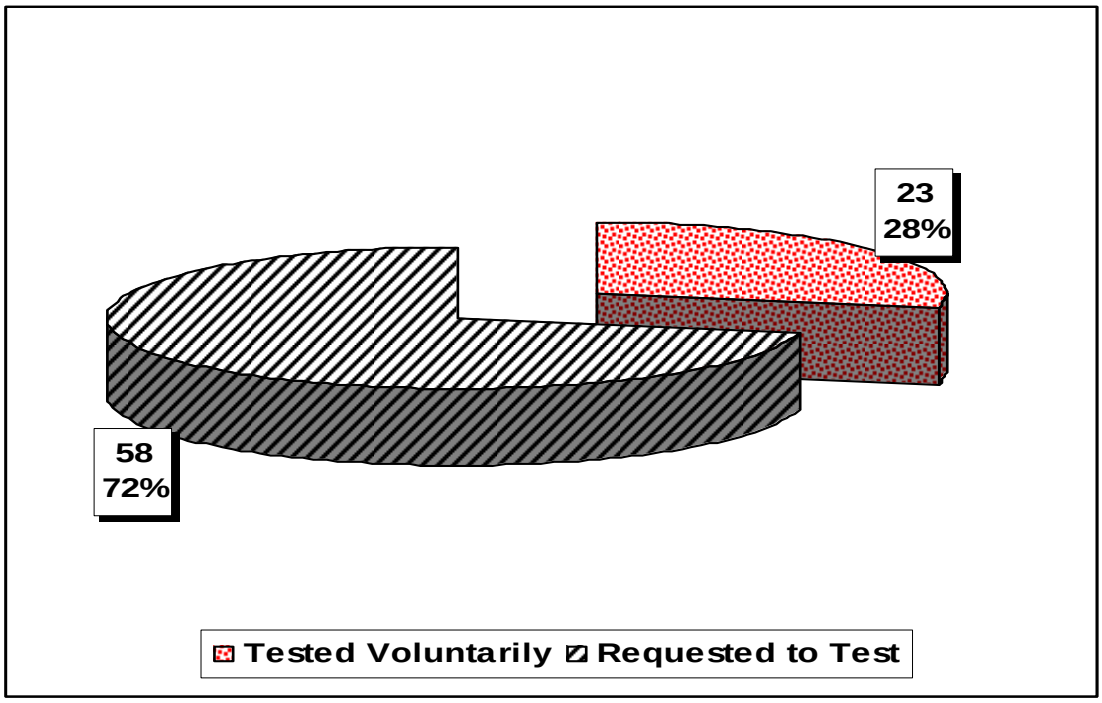


Table 17: Results of HIV test among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 81)

Result	Frequency	Percentage
Not infected	74	91.4
Don't Know	7	8.6
Total	81	100.0

Table 18: Sharing of needles and blades among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

	Frequency	Percentage
Shared Needles	53	4.8
Shared Blades	342	30.7

Figure 18: Hearing about condom among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1113)

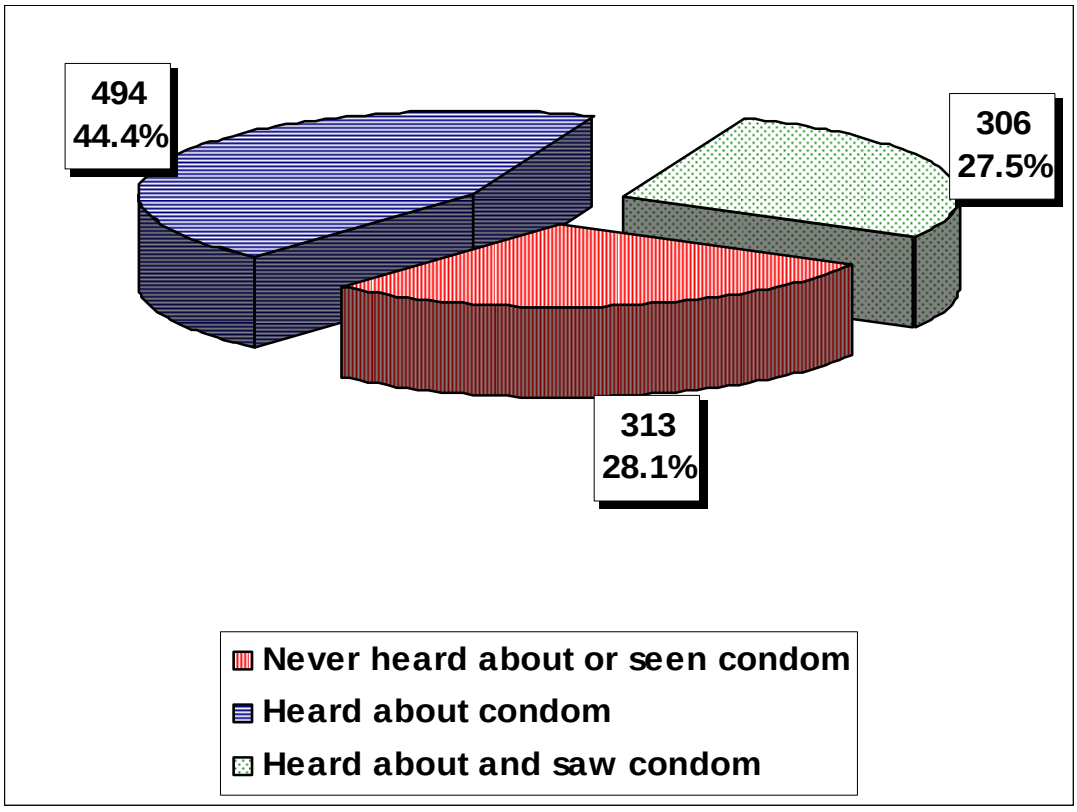


Table 19: Sources of hearing about condom among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N=800)

Source	Frequency	Percentage
Radio	76	9.5
TV	127	15.9
Relatives	160	20.0
Printed materials	161	20.1
Family planning clinic	103	12.9
Pharmacies	110	13.8
Friends and peers	319	39.9

Table 20: Possible sources where university students may get condoms, HIV/AIDS behavioural survey, Sudan, 2004 (N= 800)

Source	Frequency	Percentage
Shops	3	0.4
Market	14	1.8
Pharmacies	516	64.5
Hospitals	37	4.6
Family planning clinic	38	4.8
Health Centre/Unit	31	3.9
NGOs clinics	15	1.9
Private clinics	7	0.9
Friends and peers	34	4.3

Figure 19: Use of condom among university students HIV/AIDS behavioural survey, Sudan, 2004 (N= 800)

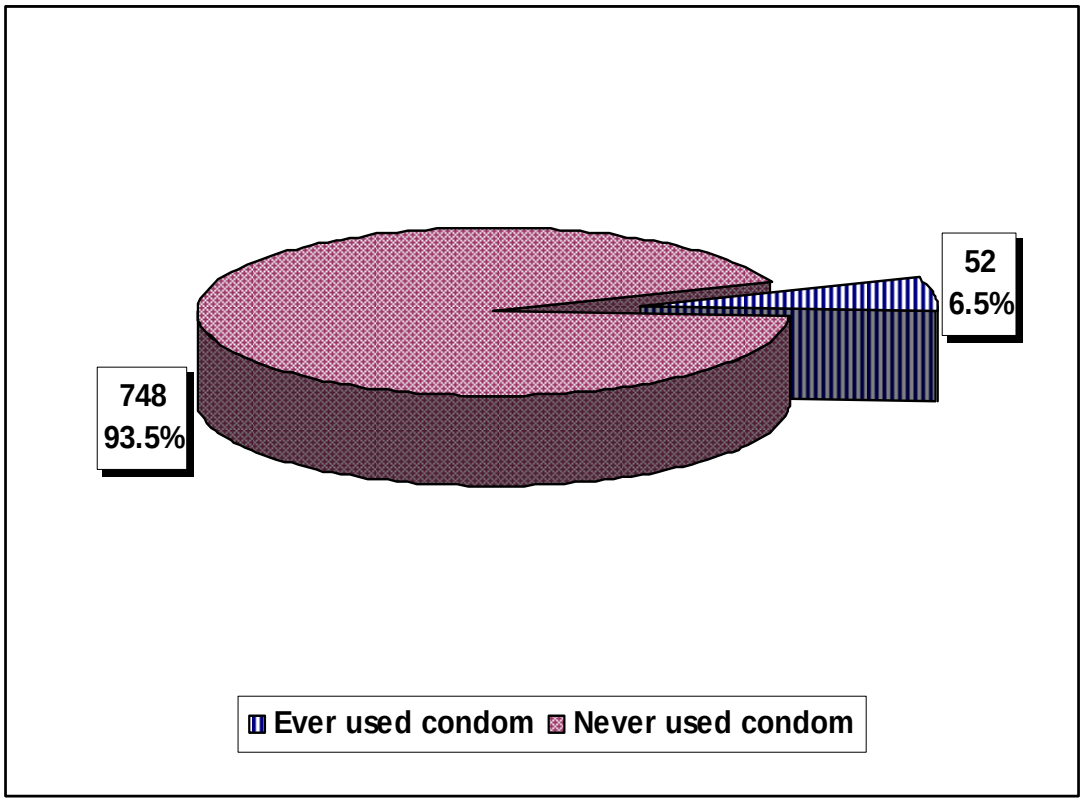


Table 21: Cross tabulation of gender, income and age by use of condoms among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 800)

		Have you ever used condom			P Value
		YES No. (%)	NO No. (%)	Total No. (%)	**< 0.05**
Gender	**Male**	49 (10.1)	436 (89.9)	485 (100.0)	
	Female	3 (1.0)	312 (99.0)	315 (100.0)	
Total		52 (6.5)	748 (93.5)	800 (100.0)	
Do you have other income source	**YES**	20 (10.6)	169 (89.4)	189 (100.0)	**< 0.05**
	NO	32 (5.2)	579 (94.8)	611 (100.0)	
Total		52 (6.5)	748 (93.5)	800 (100.0)	
AGE GROUPS	**<20**	9 (4.8)	178 (95.2)	187 (100.0)	
	20-22	22 (6.8)	300 (93.2)	322 (100.0)	
	>22	21 (7.2)	270 (92.8)	291 (100.0)	
Total		52 (6.5)	748 (93.5)	800 (100.0)	

Table 22: Reasons for using condom among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 52)

Reason	Frequency	Percentage
To prevent HIV infection	28	53.8
To prevent STIs	16	30.8
As contraceptive	30	57.7
Requested by partner	3	5.8

Table 23: Sexual activity among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 1113)

Status	Frequency	Percentage
Never practised sex	975	87.6
Practising sex	77	6.9
Practised sex in the past	57	5.1
Practised sex before marriage	4	0.4
Total	1113	100.0

Table 24: Age at first sexual intercourse among sexually active university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 138)

Age (Years)	Frequency	Percentage
12-14	34	24.6
15-17	52	6.9
18-20	43	5.1
>20	9	0.4
Total	138	100.0

*** Mean age at first sexual intercourse 16.5 ± 3 years.**

*** Median age at first sexual intercourse 16 years.**

Figure 20: Number of sexual partners among sexually active university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 138)

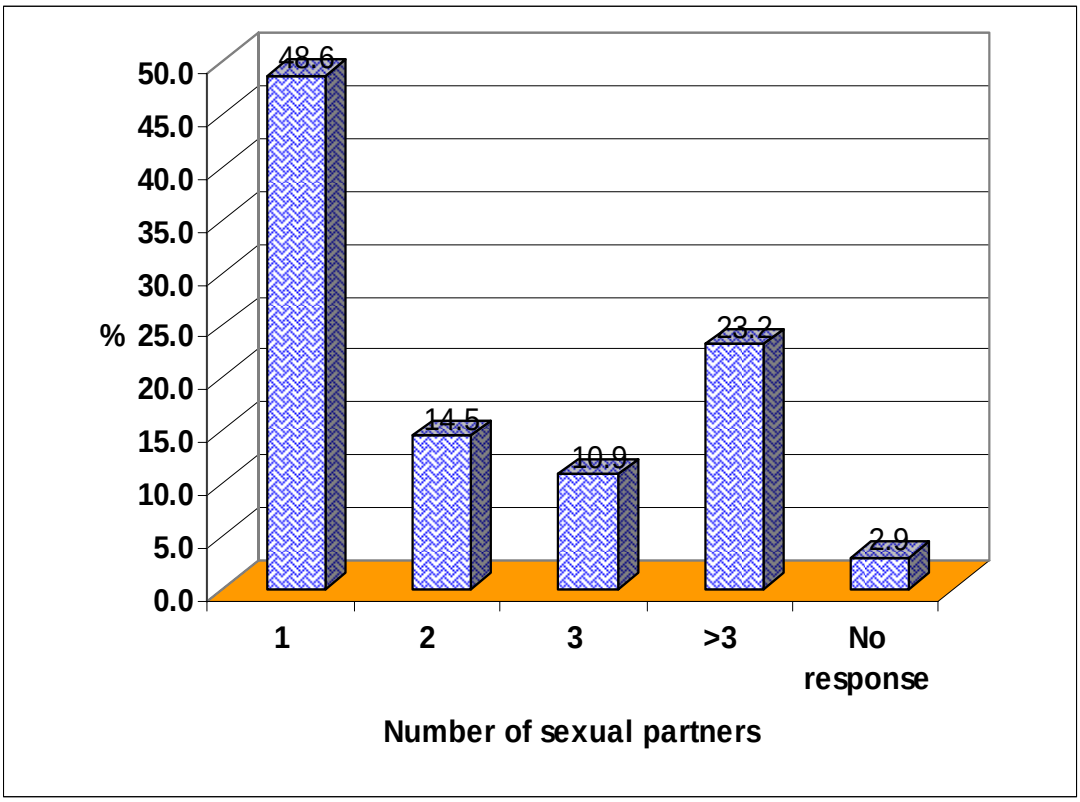


Table 25: Factors pushing for practising sex among sexually active university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 138)

Factor	Frequency	Percentage
Economic reasons	1	0.7
For enjoyment	100	72.5
Influenced by friends and peers	21	15.2
Leisure time	15	10.9
No response	1	0.7
Total	138	100.0

Table 26: Awareness of sexually active university students about their sexual partners having sex with others, HIV/AIDS behavioural survey, Sudan, 2004 (N= 138)

Status	Frequency	Percentage
Partners practice sex with others	19	13.8
Partners don't practice sex with others	96	69.6
Don't Know	18	13.0
No response	5	3.6
Total	138	100.0

Table 27: Condom use among sexually active university students, HIV/AIDS behavioural survey, Sudan, 2004 (N= 138)

Level of use	Frequency	Percentage
Used condom during last sexual intercourse	33	23.9
Consistently using condom during last year	5	3.6
Used condom irregularly during last year	9	6.5
Never used condom	86	62.4
No response	5	3.6
Total	138	100.0

Table 28: Estimated prevalence of STIs among university students during the last 12 months, HIV/AIDS behavioural survey, Sudan, 2004

STI Syndrome	Frequency	Population size	Prevalence
Urethral discharge	17	553	3.1%
Vaginal discharge	46	560	8.2%
Genital ulcer	15	1113	1.3%

Table 29: Duration of STIs episodes among university students, HIV/AIDS Behavioural Survey, Sudan, 2004 (N = 78)

Duration in years	Frequency	Percent
≤ 1	65	83.3
2	8	10.3
3	1	1.3
> 3	4	5.1
Total	78	100.0

Table 30: Behaviour of sexually active University Students during STI episode, HIV/AIDS Behavioural Survey, Sudan, 2004 (N= 78)

Attitude	Frequency	Percentage
Received medical treatment	63	80.8
Received care in governmental health unit	35	44.9
Received care in work-place health unit	4	5.1
Received care in a private clinic	24	30.8
Received treatment from private pharmacy	4	5.1
Received traditional treatment	3	3.8
Used home remedy	5	6.4
Practiced sex during STIs	5	6.4
Used condom during STIs	4	5.1
Informed sexual partners	0	0
Informed friends or peers	4	5.1
Informed relatives	11	14.1

Figure 21: Access to Radio and TV among university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1113)

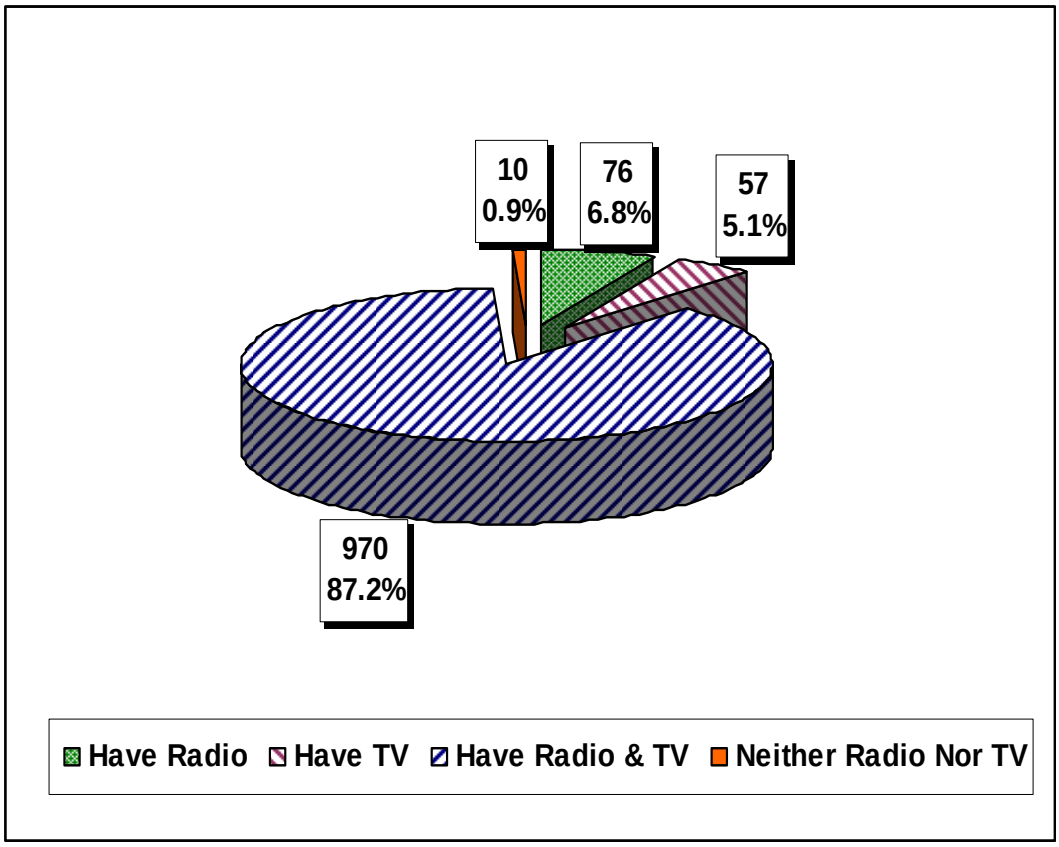


Table 31: Preferred radio stations for university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1046)

Preferred station	Frequency	Percentage
National radio	630	60.2
State radio	321	30.7
International radio	382	36.5
Not listening to radio	178	17.0

Table 32: Preferred radio listening time for university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 868)

Station and Time	Frequency	Percentage
National radio, morning programmes	252	29.0
National radio, evening programmes	333	38.4
State radio, morning programmes	48	5.5
State radio, evening programmes	50	5.8
International radio programmes	179	20.6
No response	6	0.7
Total	868	100.0

Table 33: Preferred TV stations for university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1027)

Preferred station	Frequency	Percentage
National TV	624	60.8
State TV	204	19.9
Satellite TV	506	49.3
Not watching TV	39	3.8

Table 34: Preferred TV watching time for university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 988)

Station and Time	Frequency	Percentage
National TV, morning programmes	143	14.4
National TV, evening programmes	417	42.2
State TV, morning programmes	10	1.0
State TV, evening programmes	45	4.6
Satellite TV, morning programmes	48	4.9
Satellite TV, evening programmes	325	32.9
Total	988	100.0

Figure 22: Exposure of university students to HIV IEC programmes, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1113)

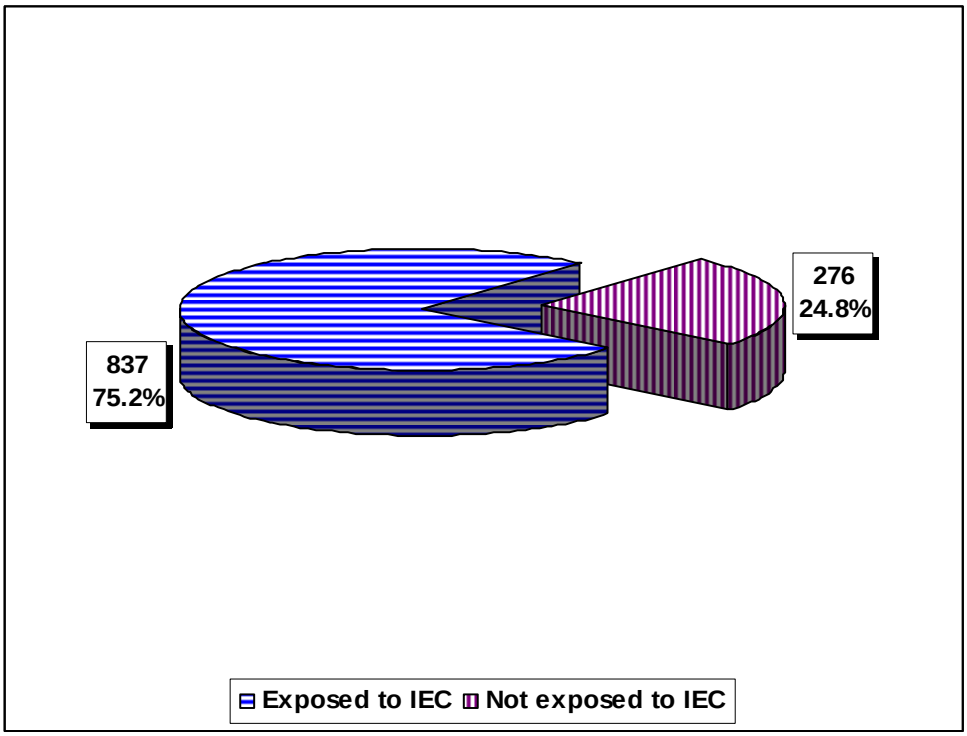


Table 35: Preferred IEC channel for university students, HIV/AIDS behavioural survey, Sudan, 2004 (N = 1113)

Preferred communication channel	Frequency	Percentage
Radio	661	59.4
TV	693	62.3
Religious institutions	211	19.0
Public lectures	668	60.0
Mobile cinema	127	11.4
Education curricula	239	21.5
Friends and peers	99	8.5
Printed materials	503	45.2
Theatre/ Drama	131	11.8

Chapter Four

4.1. DISCUSSION:

This is a descriptive cross-sectional study aiming at assessing knowledge, attitudes, behaviour and practices related to HIV/AIDS among university students in 10 states of Sudan. The standardized behavioural surveillance surveys (BSS) methodology of UNAIDS/FHI was used, with adaptation of questionnaire.

Although the vast majority of university students were not working, a considerable proportion of them indicated that they have other income sources in addition to the direct support provided by their families. These income sources were mainly kinship support from relatives. Because of the fact that the majority of students were still dependent on family support, only a small proportion of them were married. This also goes with available data about age at first marriage in Sudan. The singulate mean age at marriage was calculated at 30 and 24 years for males and females respectively in the safe motherhood survey 1999 (36).

The levels of knowledge about AIDS, HIV as causative agent of AIDS, transmission of HIV were high compared to the results of the national survey conducted 2002. The increase in levels of knowledge may be attributed to the fact that this study was confined to university students while the national survey included many population sub-groups. University students were in better place regarding access to information and media and exposure to HIV interventions e.g. the HIV prevention programme of the Ministry of Higher Education and Scientific Research. Knowledge about sexual transmission of HIV was statistically significantly higher among older age groups compared to younger age groups. This difference in level of knowledge between age groups may be attributed to exposure of older students to HIV preventive intervention within the university, while younger students not yet exposed. There was no statistically significant difference between males and females regarding their knowledge about sexual transmission of HIV. However, knowledge about blood transmission of HIV was statistically significantly higher among females compared to males.

Television was the commonest source for information about HIV/AIDS among university students, followed by radio and newspapers. The role of television in this study overweighed that of radio as it was the main source of information in the national behavioural survey. This may be explained by easy access to radio in rural communities

compared to television, while in this study the population mostly live in urban settings and access to television is wider and easier.

Knowledge about asymptomatic HIV infection i.e. HIV infected person may look healthy was also higher than the 2002 national survey level. However, knowledge about asymptomatic HIV infection was still lower than levels recorded in Zimbabwe BSS among male youth in 1999, which was 94% (33). Although there was no statistically significant difference between males and females with regard to knowledge about asymptomatic HIV infection, the difference was statistically significant between younger and older age groups with better knowledge in the latter group.

Knowledge about HIV preventive measures was low regarding knowledge about condom use and faithfulness to single non-infected partner. This result was similar to that obtained in the national survey 2002. In Zimbabwe, BSS conducted 1999 revealed that 71% of male youth identified faithfulness to single non-infected partner as HIV preventive measure (33). The vast difference in levels of knowledge between Zimbabwe BSS and this study may be explained by cultural variations and other programmatic factors like duration of HIV interventions in Zimbabwe which started very early compared to Sudan.

Abandoning illegal sexual intercourse and sharing of skin-piercing instruments were more widely identified as HIV preventive measures. These two measures scored higher levels of knowledge than 2002 national survey. There was a statistically significant difference between males and females and between the different age groups with regard to their knowledge about condom as HIV preventive measure. This disparity in knowledge about HIV preventive measures may be attributed to the religious and cultural influences which address abandoning illegal sexual relationships. Furthermore, IEC interventions using mass media may be very conservative and not presenting condom as one of the HIV preventive options as reflected in this study that mass media, especially radio and television, were the major sources of information about HIV/AIDS while friends and peers were major sources of information about condom.

Misconceptions about HIV transmission still there among university students, with considerable proportion of them believed that HIV may be transmitted by mosquito bites or by eating with HIV infected individual. This may be largely attributed to gaps in HIV

educational programmes i.e. they present and discuss modes of HIV transmission and ignore presenting and discussing common misconceptions about HIV transmission, given the fact that HIV is relatively a new epidemic and it was recognized recently as one of the major epidemics in Sudan.

Levels of stigma and discrimination against people living with HIV/AIDS were mostly lower than those reported in the 2002 national survey, but they were still high. There was a statistically significant difference between males and females regarding tendency to refuse eating with HIV infected person i.e. females were more likely to refuse eating with HIV infected person. Acceptance of buying food from HIV infected person was statistically significantly related with both gender and age i.e. females and younger age group students (<20 years) were more likely to refuse buying food from HIV infected person. This high level of stigma related to HIV may be attributed to gaps in awareness programmes i.e. they were not properly addressing stigma issues and/or the nature of HIV being incurable and life-lasting infection that is recently discovered and the tendency to link HIV infection with sexual behaviour that is culturally and religiously prohibited in the conservative community. Moreover, there were misconceptions about HIV transmission that might influence attitudes towards people living with HIV/AIDS e.g. the false believe that HIV may be transmitted by eating with HIV infected person would definitely lead to refusal of eating with that person. Some discriminative attitudes against people living with HIV/AIDS may also be based on the assumption that HIV infected people have tendency to revenge and widely spread HIV infection.

A small proportion of university students experienced HIV testing, whether voluntarily or requested for some reason. This result was not far higher than the national survey result 2002. The use of voluntary counselling and testing (VCT) services was still very low, and this may be attributed to lack of supportive information within awareness programmes that stresses importance of VCT and encourages people to go for voluntary counselling and testing. People might not be aware of the benefits of knowing their HIV status and some of them might think of being quarantined if they tested positive for HIV. The high levels of stigma and discrimination related to HIV/AIDS is well known to adversely affect utilization of HIV/AIDS services including VCT. Fear, denial, along with stigma and discrimination, keep people from taking advantage of those VCT services that are

available (37). As a result of the stigma and discrimination surrounding HIV/AIDS, those who do know their HIV status are afraid to disclose it because of the risk of job loss, social ostracism, violence and threats to their lives, and other adverse consequences. Those who do not know their status are afraid to get tested if they fear that the results will be made known against their will and they will face stigma and discrimination (38).

Although a large proportion of university students never heard about or seen condom, this proportion was lower than the level of 2002 national survey. The commonest sources of hearing about condom were friends and peers, followed by printed materials and relatives. The most common source of getting condoms mentioned by university students was pharmacies. The sources of information about condom were similar to those identified in the 2002 national survey. This reflects the importance of using friends and peers in behavioural change communication programmes. It also indicates the limited role played by mass media channels in addressing sensitive issues like condom use.

Despite the large proportion of university students who heard about condom, the level of condom use was low, although it was a bit higher than the level reported in the 2002 national survey. This low level of condom use may be explained by the low level of knowledge about condom as HIV preventive measure. The influence of culture and religion may be other contributing factor that reduced condom use among university students. These might be aggravated by difficulty to access condoms, whether due to inability to afford its cost, lack of convenient health care facility/provider or lack of information about where to get condoms. There was a statistically significant difference between males and females regarding condom use, with males reporting condom use more than females. There was also statistically significant difference between students who have other income sources and those who don't have regarding their use of condoms. Students who have other income sources reported more condom use. This might support the assumption that inability to afford the cost of condoms is one of the factors that reduced condom use among university students. The majority of students who reported condom use have used it to prevent HIV infection and as contraceptive method. In other African countries e.g. Zimbabwe, Nigeria and Ghana, BSS reported high levels of condom use among youth compared to Sudan (33 – 35). In addition to cultural and religious variations between Sudan and these countries, other contributing factors for this

difference in levels of condom use may be related to condom promotion programmes which aim at improving knowledge about and access to condoms and ultimately increasing its use.

The majority of university students reported that they never practised sex. Within the small proportion who reported practising sex, whether in the past or at the study time, the level of engagement in sexual relationships with multiple partners was high, almost half of sexually active students had more than one sexual partner. The level of those who ever had sex was far below levels reported in Zimbabwe and Nigeria. [33, 34] Among those who ever had sex, the level of engagement in sex with more than one partner was not far below the level reported in Nigeria (34).

The median age at which university students started sexual activity was the same as reported in the 2002 national survey. It was also similar to the median age at first sex reported among youth in Nigeria [34] but lower than that reported in Zimbabwe.[33] The most common factors driving sexual activity among university students were enjoyment, influence by friends and peers and leisure time. Economic reasons were reported by negligible proportion of university students, which might be explained by more males reporting sexual activity than females. The majority of sexually active students believed that their sexual partners didn't' practice sex commercially. Despite the high level of multiple sexual relationships among sexually active students, only few of them reported consistent condom use during last year, and the vast majority never used condom. These findings indicate high level of vulnerability to HIV among sexually active university students.

More than one half of sexually active students reported suffering STIs symptoms during the last 12 months. When asked about their attitude during an episode of STI, the majority reported receiving medical treatment, few of them practised sex or used condom during STI episode. None of them reported informing their sexual partners about their STI episode, while they have tendency to inform friends and relatives. The estimated prevalence of urethral discharge and genital ulcer during the last 12 months among university students was just below the prevalence reported in Zimbabwe (33) but far below that in Ghana (35). It is worth to notice that despite the high vulnerability of university students to HIV/STIs reflected by the high level of engagement in multiple

sexual relationships and low level of condom use among sexually active students, the prevalence of STIs was lower than that in other African countries. This may be explained by the small proportion of students vulnerable to STIs in this study i.e. students who ever had sex compared to other countries where STIs prevalence was higher.

The vast majority of university students reported having access to both radio and television. A large proportion preferred listening to the national radio station of Omdurman while the rest preferred listening to state radio stations. The dominance of national radio listeners may be explained by having large portion of this survey sample from Khartoum State. Both national and state radio listeners were almost equally divided between morning and evening programmes regarding their preferred listening time.

The majority of students preferred watching national TV while the rest preferred watching state TV. The preferred watching time for both national and state TV was mostly evening programmes. Considerable proportion of students preferred listening to international radio stations and watching satellite TV channels.

The most preferred communication channels mentioned by university students were TV, public lectures, radio and printed materials. A large proportion of university students were exposed to IEC programmes and HIV interventions. This level of exposure to educational programmes was well reflected in the levels of knowledge about HIV, while the levels of stigma and discrimination, use of preventive measures like condom use were extremely low given such level of exposure to educational programmes. It indicates the need for other supportive strategies that facilitate the behavioural change process and adoption of safer sexual behaviour.

4.2. CONCLUSION:

- Although levels of knowledge about HIV/AIDS among university students were found to be high compared to the results obtained in 2002 national survey, there were still gaps in knowledge about HIV/AIDS. These gaps in knowledge were sometimes statistically significantly related to gender and age, the gaps being wider among female students and younger age groups. Knowledge about HIV preventive measure was weak, especially faithfulness 299 (26.9%) and condom use 136 (12.2%). Misconceptions about HIV transmission were still there, with 191 (17.2%) students mentioned mosquito bite as route of HIV transmission and 117(10.5%) mentioned eating with infected person transmit HIV.
- Levels of stigma and discrimination against PLWHA were high among university students. 174 (16%) of the students would not accept nursing a relative with HIV/AIDS, 256 (23%) would not accept eating with HIV infected person, 732 (66%) would not accept buying food from HIV infected person and 531 (47.84%) would tend to hide HIV infection of a family member. The levels of discrimination were statistically significantly affected by gender, with females having more tendencies to discriminate and stigmatize PLWHA.
- VCT use was very low, only 23 (2%) students had voluntary test for HIV.
- A considerable number of students, 342 (30.7%), shared blades with others, and 53 (4.8%) students shared needles with others.
- Only 52 (4.7%) students ever used condoms. Condom use was more likely among males compared to females and among students with other income sources compared to those with no other income sources.
- The majority of university students never practised sex (87.6%). However, among those who ever had sex, almost one half of them had more than one sexual partner, 14% recognized that their sexual partners had sex with other partners and 62.4% never used condom. The median age at first sexual intercourse was 16 years.
- The estimated prevalence of urethral discharge was 3.1%, vaginal discharge was 8.2% and genital ulcer was 1.3% during the last 12 months among university students.

- The majority of university students (87.2%) reported having access to both Radio and Television. Mass media, especially radio and television were found to have major role in raising awareness and disseminating knowledge about HIV/AIDS, however they have limited role in discussing sensitive issues like condom and its HIV preventive role. Peers and friends were found to be major source of knowledge about condom.
- The most preferred communication channels mentioned by university students were TV (62.3%), public lectures (60.0%), Radio (59.4%) and printed materials (45.2%).

4.3. RECOMMENDATIONS:

1. This study identified certain gaps in knowledge about HIV/AIDS among university students (Mother-to-child transmission, HIV preventive measures, and misconceptions about HIV transmission). SNAP at national and state levels to recommend for partners and programmes implementers addressing these gaps in their IEC and BCC interventions. The gender and age factors that influenced these gaps need to be properly addressed.
2. Levels of stigma and discrimination related to HIV were high. SNAP at national and state levels to design interventions that address issues of stigma and discrimination against PLWHA.
3. Use of existing VCT services was very low among university students. SNAP and Ministry of Higher Education and Scientific Research to conduct further analysis of this situation and provide practical recommendations to improve access to and use of VCT services.
4. Adoption of safer sexual behaviour was low among sexually active university students. Multiple sexual relationships were high while condom use was very low among sexually active students. SNAP and Ministry of Higher Education and Scientific Research to conduct further qualitative research to identify barriers hampering adoption of safer sexual behaviour and provide recommendations to programmers.
5. Mass media were found to have good role with regard to raising general awareness, while friends and peers were discovered to have considerable role in relation to sensitive issues like condom use. SNAP at national and state levels, Ministry of Higher Education and Scientific Research and NGOs to pilot peer education project among university students and other vulnerable population sub-groups for BCC, supported by mass media campaigns.

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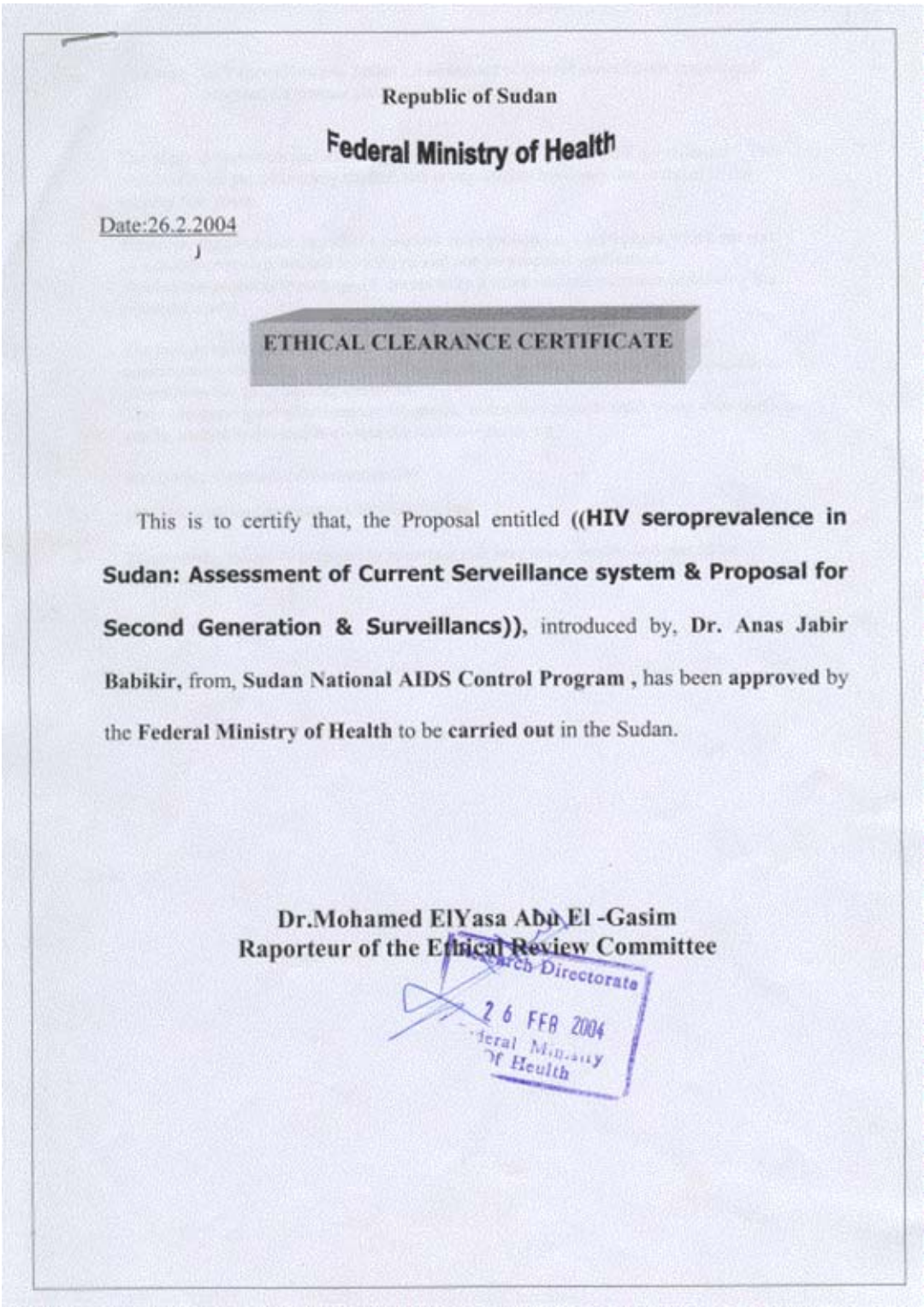
4.5. Appendices:

Appendix (1)



Republic of Sudan

Federal Ministry of Health

Date:26.2.2004

ETHICAL CLEARANCE CERTIFICATE

This is to certify that, the Proposal entitled ((**HIV seroprevalence in Sudan: Assessment of Current Serveillance system & Proposal for Second Generation & Surveillancs)**), introduced by, **Dr. Anas Jabir Babikir,** from, **Sudan National AIDS Control Program ,** has been **approved** by the **Federal Ministry of Health** to be **carried out** in the Sudan.

Dr.Mohamed ElYasa Abu El -Gasim
Raporteur of the Ethical Review Committee

Research Directorate
26 FEB 2004
Federal Ministry
Of Health

Appendix (2)

FEDERAL MINISTRY OF HEALTH
SUDAN NATIONAL AIDS CONTROL PROGRAMME
BEHAVIORAL SURVEY AMONG UNIVERSITY STUDENTS
2004

CLUSTER SELECTION SHEET (PROBABILITY PROPORTIONAL TO SIZE)

STATE …….

Cluster Number	Cluster Name	Measure of Size (target group members)	Cumulative Size	Cluster Interval	Sample Selection Number	Mark the Cluster Selected

Total cumulative measure of size (MOS):
Planned number of clusters:
Sampling interval (Total MOS / Planned number of clusters):
Random Start (Random number between 1 and Sampling Interval):
Cluster Selected:

Instructions for using Cluster Selection Sheet (Probability Proportional to Size)

*** Steps in the selection of a systematic-random sample of clusters with probability proportional to size (PPS)**

1. Prepare a list of clusters with a corresponding measure of size for each;

2. Starting at the top of the list, calculate the cumulative measure of size and enter these figures in a column next to the measure of size for each unit;

3. Calculate the sampling interval (SI) by dividing the total cumulative measure of size (M) by the number of clusters to be selected (a) that is, SI = M/a;

4. Select a random number (RS) between 1 and (SI). Compare this number with the cumulated measure of size column. The unit within whose cumulated measure of size the number (RS) falls is the first sample unit;

5. Subsequent units are chosen by adding the sampling interval (SI) to the number identified in step (4); that is RS + SI, RS + 2SI, RS + 3SI, etc;

6. This procedure is followed until the list has been exhausted.

Note: In selecting sample clusters, it is important that the decimal points in the sampling interval be retained. The rule to be followed is that when the decimal part of the sample selection number is less than 0.5, the lower numbered cluster is chosen, and when the decimal part of the sample selection number is 0.5 or greater, the higher numbered cluster is chosen.

Appendix (3)

FEDERAL MINISTRY OF HEALTH
SUDAN NATIONAL AIDS CONTROL PROGRAMME
BEHAVIORAL SURVEY AMONG UNIVERSITY STUDENTS
2004

CLUSTER INFORMATION SHEET

State …….....

Cluster Number ……

Cluster Name ……

Date and Time when Cluster is visited ……

1. **Estimated Measure of Size for Cluster (if it was available before the survey):**
2. **Actual Measure of Size for Cluster (number of people at the site on the day of the survey):**
3. **Number of people approached to be interviewed:**
4. **Number of people who refused to be interviewed after being approached:**
5. **Number of Duplicates (people interviewed previously on another day or at another site):**
6. **Number of Interviews Completed:**

Note: It is highly recommended that separate cluster information be kept for each cluster.

Instructions for using the Cluster Information Sheet:

It is very important that the interviewing team (with the help of the supervisor if Necessary), complete all the information specified on the cluster information sheet. This will allow for calculating sampling probabilities and performing a weighted analysis (Should that be necessary).

1. The estimated measure of size is whatever was obtained during the mapping and development of the sampling frame.

2. The *actual* measure of size on the day of the survey is needed to help determine how accurate the PPS sampling was. If very different measures of size are found than what was expected, this *actual* measure of size will be essential for calculating the sampling probability, and ultimately the sampling weight. The measure of size does not need to be exact, but should approximate as closely as possible the number of target group members at the site.

3. The number of people approached to be interviewed refers to people who are randomly selected at the site. This number is used as the denominator for the refusal rate for the cluster.

4. The number of people who refuse to be interviewed refers to people who are invited to participate in the survey (after being randomly selected), but who decline to be interviewed. It is used as the numerator for the refusal rate for the cluster.

5. The number of duplicates refers to people who have already been interviewed as part of this survey. This may happen if you are using a "take-all" approach and the site was visited previously. It may also happen if this is a mobile population and you happen to select a person who was previously interviewed at another site.
6. The number of interviews completed refers to the number of people who were randomly selected to be interviewed, and for whom a questionnaire was completed.